



1553-FGC 101 1010 Uen A

## Video Processor



### HANDBOOK

**VP/CHASSIS/1AC, VP/CHASSIS/2AC and Options**

**Software Version 1.9.0 (and later)**

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## Preliminary Information

### Scope of This Information

This topic defines who should use this information, and what equipment and options are covered.

### About This Information

Tabulates the history of this information. Lists the templates and style sheets used to create the file.

### Trademarks

List the trademarks and registered trademarks associated with the equipment.

### Warning, Cautions and Notes

Defines the use and format of Warnings, Cautions and Notes throughout this information.

### Contact Information

Gives contact information for Ericsson Customer Services, and Technical Training.

### Compliance Statements

Compliance statements relating to EN55022/AS/NZS 3548 and FCC.

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## Scope of This Information

### Who Should Use this Handbook

This guide is written for operators and users of the Video Processor and describes its functions and operation. It will assist in the installation and day-to-day care and operation of the unit. Maintenance information that requires covers to be removed is not included.

### WARNING!

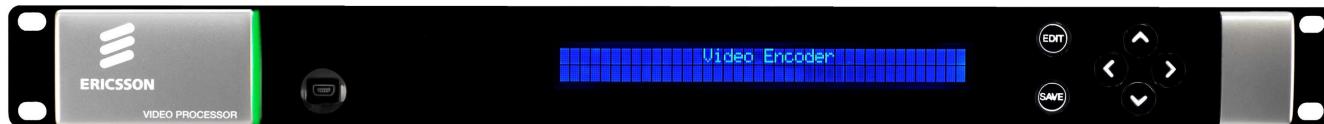
Do not remove the covers of this equipment. Hazardous voltages are present within this equipment and may be exposed if the covers are removed. Only suitably trained and experienced service engineers are permitted to service this equipment.

### CAUTION!

Unauthorised maintenance or the use of non-approved replacements may affect the equipment specification and invalidate any warranties.

## What Equipment is Covered by this Handbook

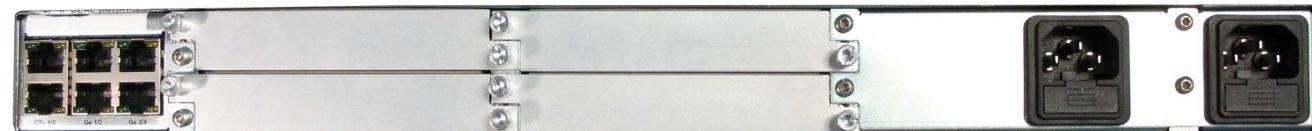
### The Equipment Models



Front View of the Video Processor.



Rear View of the Video Processor, single AC PSU variant.



Rear View of the Video Processor, dual AC PSU variant

### Product Codes

This information covers products with the marketing codes shown in the following table

Marketing Code	Description	Summary of Features
VP/CHASSIS/1AC	Video Processor with single AC input	See Introduction>Base Chassis> <a href="#">Base Unit (AC)</a>
VP/CHASSIS/2AC	Video Processor with single AC input	See Introduction>Base Chassis> <a href="#">Base Unit (Dual AC)</a>
VP/HWO/EN8190/ENC	EN8190 H.264 HD Encoder Module	See Introduction>Option Cards> <a href="#">EN8190 HD H.264 VCM</a>
VP/HWO/EN8100/ENC	EN8100 MPEG-2 SD Encoder Module	See Introduction>Option Cards> <a href="#">EN8100 SD MPEG-2 VCM</a>
VP/HWO/EN7100/ENC	EN7100 MPEG-2 SD Encoder Module	See Introduction>Option Cards> <a href="#">EN7100 SD MPEG-2 VCM</a>
VP/HWO/EN8130/ENC	EN8130 H.264 SD Encoder Module	See Introduction>Option Cards> <a href="#">EN8130 SD H.264 VCM</a>

VP/HWO/EN8180/ENC	EN8180 MPEG-2 HD Encoder Module	See Introduction>Option Cards> <a href="#">EN8180 HD MPEG-2 VCM</a>
VP/HWO/ASI/2IN2OUT	ASI I/O Module	See Introduction>Option Cards> <a href="#">ASI Option Module</a>
VP/HWO/EXTSYNC	Video Processor External Sync Module	See Introduction>Option Cards> <a href="#">External Sync Input</a>
VP/CAB/BAL	D-Type to balanced XLR breakout cable	See Installing the Equipment>External Interfaces> VCM> <a href="#">Audio Input</a>
VP/CAB/UNBAL	D-Type to unbalanced XLR breakout cable	See Installing the Equipment>External Interfaces> VCM> <a href="#">Audio Input</a>

## Firmware/Software Versions

This information covers the functionality of the firmware/software versions which are contained within the Software Release Version 1.9.x .

This handbook continues to be relevant to subsequent build versions where the functionality of the equipment has not changed. Where the build standard changes the functionality, a new issue of this handbook will be provided.

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## About this Information

### Revisions

Any revision of this information will be by a complete reissue.

Issues are listed below:

Issue	Date	Build Version	Comments
1	July 2009	1.0	Initial release.
2	October 2009	1.1	New release with additional features
3	January 2010	1.2	New release with additional features
4	December 2010	1.6	New release with additional features
			New release with additional features
5	January 2011	1.9	Ericsson Document Number 1553-FGC 101 1010 Uen A

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## Trademarks

### General

All best endeavours have been made to acknowledge registered trademarks and trademarks. Any notified omissions will be rectified in the next issue. Some trademarks may be registered in some countries but not in others.

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Reflex™ is a trademark of Ericsson Television.

Stratocell™ is a trademark of the Sealed Air Corporation.

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## Warnings, Cautions and Notes

### Heed Warnings

All warnings on the product and in the operating instructions should be adhered to. The manufacturer can not be held responsible for injuries or damage where warnings and cautions have been ignored or taken lightly.

### Read Instructions

All the safety and operating instructions should be read before this product is operated.

### Follow Instructions

All operating and use instructions should be followed.

### Retain Instructions

The safety and operating instructions should be retained for future reference.

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### WARNING!

Warnings give information which, if strictly observed, will prevent personal injury or death, or damage to personal property or the environment. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

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### CAUTION!

Cautions give information which, if strictly followed, will prevent damage to equipment or other goods. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

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**NOTE:** Notes provide supplementary information. They are highlighted for emphasis, as in this example, and are placed immediately after the relevant text.

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## Contact Information

### Ericsson Customer Services

#### Support Services

Our primary objective is to provide first class customer care that is tailored to your specific business and operational requirements. All levels are supported by one or more service performance reviews to ensure the perfect partnership between Ericsson and your business.

#### Warranty

All Ericsson Products and Systems are designed and built to the highest standards and are covered under a comprehensive 12 month warranty.

#### Levels of Continuing Ericsson Service Support

For stand-alone equipment, then Ericsson's BASIC Essential support is the value for money choice for you. BASIC provides you with year-by-year Service long after the warranty has expired.

For systems support you can choose either Gold Business Critical support or Silver Business Advantage. These packages are designed to save you costs and protect your income through enlisting the help of our support specialists.

Call Ericsson Sales for more details.

#### Where to Find Us

##### Customer Services

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##### Internet Address

[www.ericsson.com](http://www.ericsson.com)

## Technical Training

### Training Courses

Ericsson provides a wide range of training courses on the operation and maintenance of our products and on their supporting technologies. We can provide both regularly scheduled courses and training tailored to individual needs. Courses can be run either at your premises or at one of our dedicated training facilities.

### Where to Find Us

For further information on the Ericsson training programme please contact us:

<b>International</b>	Tel:	+44 (0) 23 8048 4229
	Fax:	+44 (0) 23 8048 4161
	Email:	tvglobaltraining@ericsson.com

## Return of Equipment

Contact your regional Ericsson office who will issue directions on how and where to return a unit for service/repair/upgrade.

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## EN55022 and CISPR22

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Handbook, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at ones own expense.

FCC Code of Federal Regulations (CFR) Title 47 – Telecommunications, Part 15: radio frequency devices, subpart B – Unintentional Radiators.

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## Read This First!

### Personnel

Ensure the personnel designated to fit the unit have the appropriate skills and knowledge. If in any doubt, contact Customer Services (see [Contact Information](#)).

### Installation

Installation of the product should follow these instructions, and should only use installation accessories recommended by the manufacturers. When rack mounted, this equipment must have shelf supports as well as being fixed at the front panel.

## Mechanical Support

Do not use this product as a support for any other equipment.

## Web Browser access

This product is designed to support control through Web browser access. The only supported browser is Microsoft IE8 (earlier versions of IE are not supported)

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## Introduction

The Unit is a flexible platform consisting of a base unit or chassis in to which various option cards can be plugged. The base unit provides an Ethernet control interface, and Ethernet data interfaces, it also provides basic transport stream processing functionality. Other functionality such as video encoding, audio encoding, or other input or output interfaces are provided by option cards.

### License Keys

License Keys control the availability of some of the features accessible from the unit and are issued to a specific chassis, not an option card, and are held within the chassis.

### Base Chassis

This section introduces the chassis and describes the functions associated with the host controller.

### Option Cards

The following are the available option cards:

#### EN7100 SD MPEG-2 VCM

This provides high quality MPEG-2 Video encoding, and audio encoding.

#### EN8100 SD MPEG-2 VCM

This provides ultimate quality MPEG-2 Video encoding, and audio encoding.

#### EN8130 SD H.264 VCM

This provides high quality H.264 Video encoding, and audio encoding.

#### EN8180 HD MPEG-2 VCM

This provides high quality MPEG-2 Video encoding, and audio encoding.

#### EN8190 HD H.264 VCM

This provides ultimate quality H.264 Video encoding, and audio encoding.

#### ASI I/O Module

This provides two ASI outputs of the same transport stream. (ASI input functionality will be added in a subsequent release).

#### External Sync Input

This allows a studio reference to be input in to the unit to which a 27 MHz system clock reference may be locked.

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## License Keys

### Overview

License Keys control the availability of some features and are issued to a specific base unit not an option card, even if the functionality being enabled is provided by an option card.

## Features

License Keys consist of a feature, and the number of instances of this feature that are allowed within the chassis. License Keys are allocated on a 'first configured first served' basis within the chassis. If an attempt is made to enable a feature, but the required license key is not available then the feature is not enabled, and a log message is generated. When a function that has a license associated with it is disabled, the license key is released within 1 second, and therefore available to be re-allocated .

## Verifying which licenses are present in the Unit

Access to the encoder web pages is necessary to verify the licenses that are enabled on the unit. Navigate to Configure > System > Licenses. This page displays the marketing code, number of each license and a description of the feature enabled by the license.

NOTE : Short term licenses are not supported.

## Ordering Additional Licenses.

When ordering additional licenses for existing units the following information is needed:

1. Unique Chip ID of the unit is required to generate the key.  
This is retrieved by navigating to the following web page :  
**Configure > System > Base Unit > Advanced > ChipID**

2. The TOTAL FINAL number of licenses required (including licenses already enabled on the unit) needs to be provided.

The above information is used to generate a new license key file, which then needs to be loaded onto the appropriate unit.

## Entering License Keys

The keys are saved in an XML (newlicensedetail.xml) ready to be entered onto the unit via the web page

Browse to: Configure > Licenses

In the license box enter the license filename and select upload.

NOTE : The front panel CANNOT be used to enter license keys!

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## Base Chassis

### Overview

The base chassis provides the control interfaces, the data Ethernet ports, data routing between the Ethernet ports, control software running on the base chassis, and the option cards. It also provides the ability to generate MPEG-2 transport streams from elementary streams received from the option cards.

The following is a summary of the features of the base chassis:

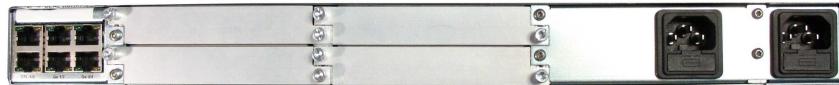
- 19" 1 'RU' rack mount chassis.
- Front panel LCD and keypad for limited control and status reporting.
- Tri-colour LED to indicate chassis health.
- Dual redundant Ethernet control ports.
- Two pairs of dual redundant Ethernet ports for data input and output.
- Single or dual AC power supply variants.
- 6 option card slots (single AC PSU chassis) or 4 option card slots (dual AC PSU chassis)
- Option cards are 'hot swappable'.



Video Processor Front Panel



Video Processor Rear Panel - Single AC Chassis (EN8100 SD MPEG-2 VCMs fitted)



Video Processor Rear Panel - Dual AC Chassis

**NOTE:** Refer to [Installing the Equipment > External Interfaces > Base Chassis](#) for more details of the items at the rear and front panels.

### **VP/CHASSIS/1AC 1U Base Chassis (AC)**

Describes the single AC power supply base chassis.

### **VP/CHASSIS/2AC 1U Base Chassis (Dual AC)**

Describes the dual AC power supply base chassis.

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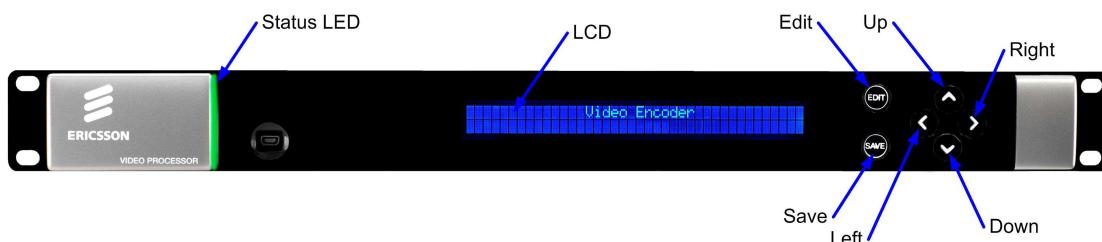
## **VP/CHASSIS/1AC 1U Base Chassis (AC)**

### **Overview**

The Video Processor consists of a base chassis, a single AC mains input and up to six option cards. The base chassis is a 1 'RU' 19" rack mount chassis that provides the control interfaces, and two pairs of dual redundant Ethernet ports for data input and output. The option cards provide the video, audio and data processing functionality and can be 'Hot Swapped', i.e. inserted or removed whilst the chassis is powered.

### **Single AC PSU Base Chassis**

#### **Front Panel**



VP/CHASSIS/1AC Front Panel Items

#### **LCD**

Control and status information is displayed on a 2 line by 40 character display.

#### **Buttons**

Six buttons are provided for navigating through the front panel menus.

#### **Status LED**

The status LED is green when there are no active alarms or warnings and red if there is a critical alarm.

The status LED is amber if there is an active warning, minor or major alarm.

#### **USB Connector**

This is not for customer use.

## Rear Panel

The option cards, control Ethernet ports, data Ethernet ports, and the AC power input are all accessible at the rear of the base chassis.



*VP/CHASSIS/1AC Rear Panel Items [Single AC Chassis]*



*Ethernet Port Numbering*

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## VP/CHASSIS/2AC 1U Base Chassis (Dual AC)

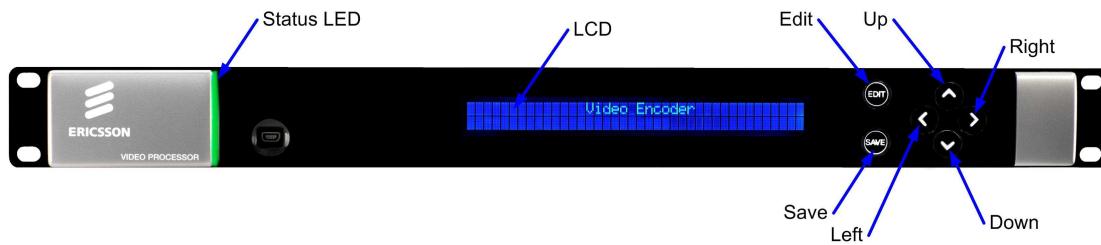
### Overview

The Video Processor consists of a base chassis, dual AC inputs and up to four option cards. The base chassis is a 1 'RU' 19" rack mount chassis that provides the control interfaces, and two pairs of dual redundant Ethernet ports for data input and output. The option cards provide the video, audio and data processing functionality and can be 'Hot Swapped', i.e. inserted or removed whilst the chassis is powered.

### Why Have Two Mains Connectors

Many broadcasting sites have two power supply chains, either from the master switchboard or, for major sites, from different points on the supply grid. As the most common cause of system failure is loss of power, feeding the chassis from the separate chains ensures reliability of supply and, therefore, continuity of service.

### Dual AC PSU Base Chassis

**Front Panel**

VP/CHASSIS/2AC Front Panel Items

**LCD**

Control and status information is displayed on a 2 line by 40 character display.

**Buttons**

Six buttons are provided for navigating through the front panel menus.

**Status LED**

The status LED is green when there are no active alarms or warnings and red if there is a critical alarm.

The status LED is amber if there is an active warning, minor or major alarm.

**USB Connector**

This is not for customer use.

**Rear Panel**

The option cards, control Ethernet ports, data Ethernet ports, and the AC power input are all accessible at the rear of the base chassis.



VP/CHASSIS/2AC Rear Panel Items [Dual AC Chassis]



Ethernet Port Numbering



## Option Cards

### Option Card Combinations

Describes the supported combinations of option cards, maximum number of cards and recommended slot location for each option card.

The following are the option cards supported in this release:

#### **EN7100 SD MPEG-2 VCM (VP/HWO/EN7100/ENC)**

This card can compress a standard definition video input using MPEG-2 encoding, and can compress up to eight channel pairs of audio depending on audio encoding mode.

#### **EN8100 SD MPEG-2 VCM (VP/HWO/EN8100/ENC)**

This card can compress a standard definition video input using MPEG-2 encoding, and can compress up to eight channel pairs of audio depending on audio encoding mode.

#### **EN8130 SD H.264 VCM (VP/HWO/EN8130/ENC)**

This card can compress a standard definition video input using H.264 encoding, and can compress up to eight channel pairs of audio depending on audio encoding mode.

#### **EN8180 HD MPEG-2 VCM (VP/HWO/EN8180/ENC)**

This card can compress a high definition video input using MPEG-2 encoding, and can compress up to eight channel pairs of audio depending on audio encoding mode.

#### **EN8190 HD H.264 VCM (VP/HWO/EN8190/ENC)**

This card can compress a high definition video input using H.264 encoding, and can compress up to eight channel pairs of audio depending on audio encoding mode.

#### **ASI Option Module(VP/HWO/ASI/2IN2OUT)**

This card provides a dual ASI output.

#### **External Sync Input (VP/HWO/EXTSYNC)**

This card provides an external synchronization input

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## Option Card Combinations

The following table lists the number of VCM option cards that can be fitted to a chassis and which slots are recommended for each.

Option Module	Maximum Number of Modules		Recommended Slot Single or Dual PSU
	Single PSU	Dual PSU	
EN8190	2 pair	2 pair	Fitted as a pair only in slots 3 & 4 or slots 1 & 2 (slot 1 or 3 = pre-processor, slot 4 or 5 = encoder)

<b>HD H.264 VCM</b>	<i>Note: If 2 x EN8190 fitted then the only other modules that may be fitted are the ASI IO module or the External Sync module.</i>		
<b>EN8100</b> 6	4	Any slot	
<b>SD MPEG-2 VCM</b>			
<b>EN7100</b> 6	4	Any slot	
<b>SD MPEG-2 VCM</b>			
<b>EN8130</b> 6	4	Any slot	
<b>SD H.264 VCM</b>			
<b>EN8180</b>			
<b>HD MPEG-2 VCM</b> 6	4	Any slot	
ASI IO Module	6	4	Slot 1 or slot 6
<b>External SYNC Module</b> 1	1	Any slot	

## Slot Numbering

Single PSU Chassis

SLOT 2	SLOT 4	SLOT 6
SLOT 1	SLOT 3	SLOT 5

Dual PSU Chassis

SLOT 2	SLOT 4
SLOT 1	SLOT 3

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## EN7100 SD MPEG-2 VCM Module

The EN7100 SD MPEG-2 VCM (HWO/EN7100/ENC) allows a high level of MPEG-2 encoding performance.

### Summary of Features

Summarises the major functionality associated with the EN7100 SD MPEG-2 VCM.

### SD MPEG-2 Video Encoding

Describes the Video processing functionality available in the EN7100 SD MPEG-2 VCM.

### Audio Encoding

Describes the Audio Inputs and Coding Modes provided by the EN7100 SD MPEG-2 VCM.

### Vertical Blanking Interval Coding

Describes the VBI data extraction and processing capabilities of the EN7100 SD MPEG-2 VCM.

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## Summary of Features

### Overview

The EN7100 SD MPEG-2 Video Compression Module (VCM) option card can encode a single standard definition [video input](#) using the MPEG-2 algorithm.



EN7100 SD MPEG-2 VCM Rear Panel

### Inputs

The card provides an SDI video input via a BNC connector, and digital audio input via a 15-way D-type connector.

- [SDI Input](#) via a  $75 \Omega$  BNC female connector.
- Audio Input via a 15-way D-Type male connector for audio and (see [Installing the Equipment > External Interfaces > SD MPEG-2 VCM > Audio Input](#))

### Video

- SDI video input.
- Frame re-synchronization.
- Programmable bandwidth filter.
- Adaptive spatial and temporal noise reduction (software option VP/SWO/SDMP2/NR)
- MPEG-2 MP@ML Video Encoding (0.256 to 15 Mbps)
- Vertical resolution: 576 or 288 (PAL), 480 or 240 (NTSC)
- Horizontal Resolution: 720, 704, 640, 544, 528, 480, 352.
- Auto Field/Frame picture encoding.
- Auto Concatenation (software option VP/SWO/ACON), Scene Cut Detection, Adaptive GOP Structure and Length.

### VBI Data

- World Standard Text (WST – ETS300472) (625 line only)
- Closed Captions: EIA-608, EIA-708 via SMPTE 334, or line 21.
- SMPTE 2016-3 AFD and Bar Data
- Wide Screen Signaling (WSS or WSS-AFD)
- Monochrome samples

### Audio Compression

- Eight channels AES/EBU digital audio input either de-embedded from SDI or via AES/EBU input connector.
- Supported audio coding modes:
  - MPEG-1 Layer II (32 kbps to 384 kbps)
  - Dolby Digital (56 kbps to 640 kbps) (software option VP/SWO/AC3)
  - Pass through of pre-encoded Dolby Digital or Dolby Digital Plus
  - AAC
  - Transcode from Dolby E

### Indications

LED indication for SD SDI lock status (see [Installing the Equipment > External Interfaces > SD MPEG-2 VCM > Video Input: LED Indication](#)).

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## SD MPEG-2 Video Encoding

### Inputs

SDI Input via 75 ohm BNC connector.

Digital Audio Input via 15 way D-Type connector

### Overview

The SD MPEG-2 VCM can encode one standard definition video input. It can also encode up to eight channel pairs of audio (with appropriate licences), or pass through pre-encoded Dolby Digital encoded audio.

The video input signal is processed in to a compressed encoded bit-stream in accordance with the MPEG-2 main Profile @ Main Level (MP@ML) specification (ISO/IEC 13818).

A constant bit rate (CBR) output can be produced and may be set to between 256 kbps and 15 Mbps. The card can also produce a variable bit rate output when operating as part of a Reflex statistical multiplexing system.

The video signal can be subjected to spatial filtering and motion adaptive noise reduction prior to being MPEG-2 encoded.

### Video Compression Functionality

The following is a summary of the Video Compression functionality available from the EN8100 SD MPEG-2 VCM.

Function	Comments
<a href="#">MPEG-2 Main Profile @ Main Level encoding</a>	See <a href="#">Transport Stream Output Overview</a> for transport stream rates.
<a href="#">Variable Seamless Mode</a>	
<a href="#">Support for a constant bit rate mode</a>	
<a href="#">Support for current reflex mode (look ahead mode 4)</a>	
<a href="#">Video Input 720x576, 25 Hz</a>	
<a href="#">Video Input 720x480, 29.97 Hz</a>	
<a href="#">Output resolutions 720, 704, 640, 544, 528, 480, 352 X 576/480 352 X 288/240</a>	Support for different resolutions including the standard set of video picture resolutions for both 625 (576/288 PAL) and 525 (480/240 NTSC) line operation.

### Test Patterns

The video pre-processor has the facility to generate a [test pattern](#).

### Loss of Video Input

On loss of video input, the SD MPEG-2 VCM can be configured to select Black, Bars and Red (a test pattern) or a freeze frame as the output. It is also possible to configure it to stop generating the compressed video component on loss of the video input.

### Impairment Reduction

The video pre-processor provides spatial/temporal noise reduction which is motion adaptive (with appropriate licences).

Impairment Reduction	Comments
<a href="#">Spatial Filtering</a>	
<a href="#">Noise Reduction (motion adaptive)</a>	Only available if license VP/SWO/SDMP2/NR has been purchased.

See also Technical Specification > SD MPEG-2 VCM > Video > [Impairment Reduction](#).

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## Audio Encoding

### Overview

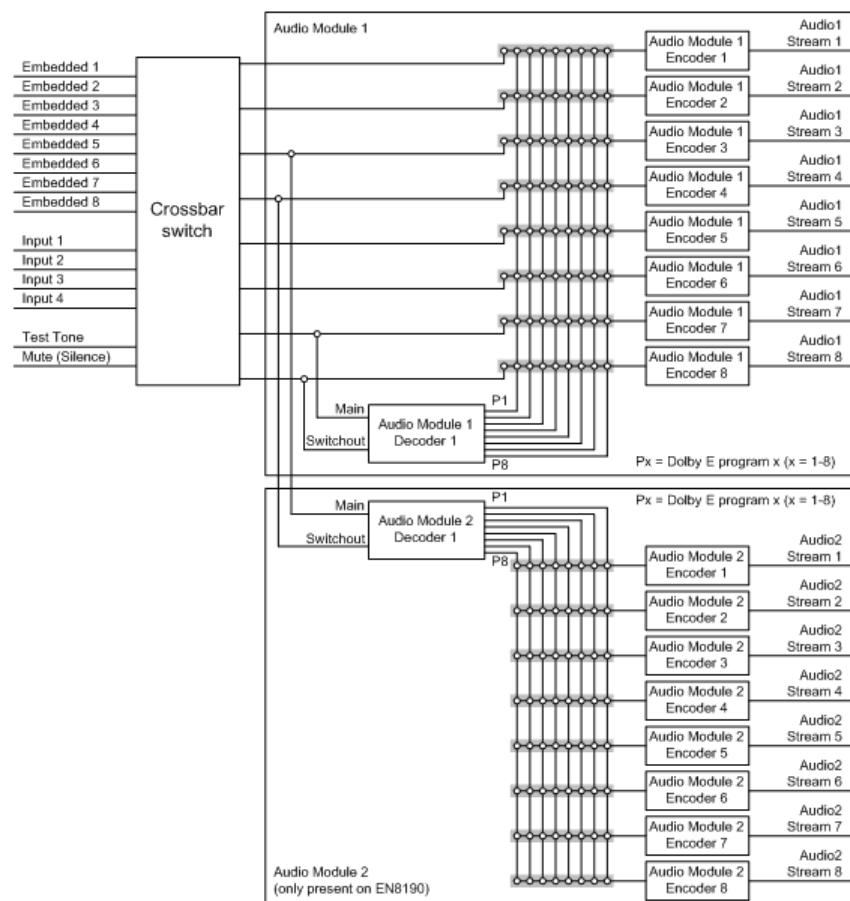
Up to eight channel pairs can be de-embedded from the HD-SDI or SDI video input, or up to four channel pairs can come via the 15 way D-Type Audio Input connector on the cards rear panel as either balanced or unbalanced AES/EBU digital audio.

If a /SWO/DOLBY/AC3 license key is available, two audio channel pairs may be encoded in accordance with the Dolby Digital specification.

Up to eight audio channel pairs of uncompressed audio can be encoded in accordance with MPEG-1 Layer II, subject to license key /SWO/M1L2 for more than two channels.

Audio that has already been Dolby Digital encoded can be input, and suitably encapsulated for inclusion in an output transport stream (pass through mode).

A total number of eight audio channel pairs can be processed of which up to two channel pairs can be encoded in accordance with the Dolby Digital specification



### Audio Input

The Pre-processing function on the VCM accepts digital audio input from either de-embedding from the HD/SD-SDI input, as a balanced pair ( $110 \Omega$ ) or unbalanced input ( $75 \Omega$ ) from the D type back panel connector.

See [Technical Specification](#) for more details.

## HD-SDI Input

Audio can be embedded on a serial digital interface ([HD-SDI](#)) feed within four groups. Each group contains two pairs. Hence each HD-SDI can carry up to a maximum of  $2 \times 4 = 8$  pairs, or 16 mono channels.

Each group has an associated Data Identifier (DID). The DIDs are set to the SMPTE 299M defaults for audio group 1 to group 4:

- Group 1 = 0x2E7
- Group 2 = 0x1E6
- Group 3 = 0x1E5
- Group 4 = 0x2E4

The DIDs are located in ancillary packets in the data stream. They are fixed at the SMPTE 299M defaults.

## SD-SDI Input

Audio can be embedded on a serial digital interface ([SDI](#)) feed within four groups. Each group contains two pairs. Hence each SDI can carry up to a maximum of  $2 \times 4 = 8$  pairs, or 16 mono channels.

Each group has an associated Data Identifier (DID). The DIDs are set to the SMPTE 272M defaults for audio group 1 to group 4:

- Group 1 = 0x2FF
- Group 2 = 0x1FD
- Group 3 = 0x1FB
- Group 4 = 0x2F9

The DIDs are located in ancillary packets in the data stream. They are fixed at the SMPTE 272M defaults. DID 1F4 is reserved for EDH error packets. Refer to the SMPTE 272M specification for more details.

## Audio Input

The [digital](#) input of the VCM accepts four stereo pairs of digital audio.

See [Technical Specification](#) for more details.

### CAUTION...

When the digital audio source is used with the AUDIO IN connector, consideration must be given to the choice of clock source used by the Encoder. To ensure correct operation, both the Encoder and the audio source may need to be genlocked to the studio source by selecting the video clock as external. Then the encoding clock is derived from an [External Sync](#) module.

## Audio Encoding Modes

Up to eight audio channel pairs of uncompressed audio can be encoded in accordance with MPEG-1 Layer II, subject to license key SWO/M1L2 for more than two channel pairs.

If a SWO/AC3 license key is available, two audio channel pairs may be encoded in accordance with the Dolby Digital specification.

Pre-encoded Dolby Digital, Dolby Digital Plus and Dolby E inputs can be suitably encapsulated for inclusion in an output transport stream.

The VCM can generate a 1 kHz test tone, which may be used in place of any audio input.

Any audio input can be associated with the video being processed, and the audio encoding delay will be matched to the video encoding delay so that audio/video synchronisation (lipsync) is maintained.

All Audio modes are configurable on a per channel basis, which includes the source of the audio, its encoding configuration and output PID.

The following is a summary of the Audio Compression functionality available.

Function	Comments	Maximum number of instances
MPEG-1 Layer II audio	The encode of two channel pairs is provided as standard. More than two encodes require the /SWO/M1L2 license (one license for each additional channel pair)	8 (mono or stereo)
Dolby Digital encoding	Only available if /SWO/DOLBY/AC3 license has	2 (mono or stereo)

	been purchased	
Dolby Digital pass through (Dolby Digital AC-3)	Glitch suppression is supported in this mode	8
Dolby Digital Plus pass through	Glitch suppression is supported in this mode	8
DolbyE pass through	Compliant with SMPTE 302M	8
LPCM pass through	Compliant with SMPTE 302M	8

## Glitch Suppression Mode

When in Dolby Digital pass through mode, the coding module monitors the encoded bitstream and if the framing structure is incorrect, a valid silence frame or the last good frame is inserted in its place. If this state occurs for more than a second, the Encoder signals that the Dolby Digital bitstream is corrupted.

## Test Tone

The VCMs can generate a [test tone](#) on any audio channel at 1 kHz

## Advanced Settings

Dolby Digital (AC-3) components by default use the descriptor defined by the DVB in the PMT. However the AC-3 PMT Descriptor Syntax control available in the Audio Module/Advanced menu enables this descriptor to be forced to the ATSC AC-3 descriptor.

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## Vertical Blanking Interval (VBI) Data

### General

All VBI information carriage are configurable (either enabled or disabled). The video line from which the VBI is extracted is configurable. The default is set according to the recognised standard for the VBI type.

### VBI Lines

Up to at least 8 VBI lines per field can be extracted. Unless otherwise stated, all VBI data are formed into one VBI transport stream packet that conforms to [ETSI EN 301 775](#) or [SCTE 127](#).

### VBI Data

Data can be extracted from the vertical blanking interval of the incoming video stream, processed, and then included in the output transport stream.

The following is a summary of the VBI Data functionality available from the unit.

Component	Comments
<a href="#">Video Index</a>	It is possible to extract video index and another VBI type from the same line.
<a href="#">Closed Captions</a>	Via line 21 & 284 (CEA-608C) or <a href="#">SMPTE 334</a> (extracted from VANC data - 525 Line only).
<a href="#">Monochrome 4:2:2</a>	Up to 3 lines can be extracted per frame.
<a href="#">Teletext</a>	Up to 18 lines can be extracted per field.
<a href="#">Aspect Ratio Signalling</a>	<a href="#">WSS/WSS-AFD/AFD/AFD and Bar Data</a> via <a href="#">VANC</a>

### VBI Data on a Separate PID

The VBI data is packetised within MPEG-2 PES packets as specified in ETSI ETS 300-472 (teletext), ETSI EN 301 775 or SCTE 127 for all other VBI data.

Refer to Transport Stream Output > [VBI Data on a Separate PID](#) for more information.

Closed caption data, and aspect ratio signalling can also be inserted in to the compressed video elementary stream.

## Timing

The VCM aligns VBI data and compressed video frames within the bounds dictated by time stamping of received data, i.e. stamp the same PTS on the video and VBI that came in on the same frame.

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## EN8100 SD MPEG-2 VCM Module

The EN8100 SD MPEG-2 VCM (HWO/EN8100/ENC) has a unique processing engine that extracts the maximum efficiency possible from the MPEG-2 specification.

### Summary of Features

Summarises the major functionality associated with the EN8100 SD MPEG-2 VCM.

### SD MPEG-2 Video Encoding

Describes the Video processing functionality available in the EN8100 SD MPEG-2 VCM.

### Audio Encoding

Describes the Audio Inputs and Coding Modes provided by the EN8100 SD MPEG-2 VCM.

### Vertical Blanking Interval Coding

Describes the VBI data extraction and processing capabilities of the EN8100 SD MPEG-2 VCM.

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## Summary of Features

### Overview

The EN8100 SD MPEG-2 Video Compression Module (VCM) option card can encode a single standard definition [video input](#) using the MPEG-2 algorithm.



EN8100 SD MPEG-2 VCM Rear Panel

### Inputs

The card provides an SDI video input via a BNC connector, and digital audio input via a 15-way D-type connector.

- [SDI Input](#) via a  $75 \Omega$  BNC female connector.
- Audio Input via a 15-way D-Type male connector for audio and (see [Installing the Equipment > External Interfaces > SD MPEG-2 VCM > Audio Input](#))

## Video

- SDI video input.
- Frame re-synchronization.
- Programmable bandwidth filter.
- Adaptive spatial and temporal noise reduction (software option VP/SWO/SDMP2/NR)
- MPEG-2 MP@HL Video Encoding (0.5 to 54 Mbps)
- Vertical resolution: 576 or 288 (PAL), 480 or 240 (NTSC)
- Horizontal Resolution: 720, 704, 640, 544, 528, 480, 352.
- Auto Field/Frame picture encoding.
- Auto Concatenation (software option VP/SWO/ACON), Scene Cut Detection, Adaptive GOP Structure and Length.

## VBI Data

- World Standard Text (WST – ETS300472) (625 line only)
- Closed Captions: EIA-608, EIA-708 via SMPTE 334, or line 21.
- SMPTE 2016-3 AFD and Bar Data
- Wide Screen Signaling (WSS or WSS-AFD)
- Monochrome Samples

## Audio Compression

- Eight channels AES/EBU digital audio input either de-embedded from SDI or via AES/EBU input connector.
- Supported audio coding modes:
  - MPEG-1 Layer II (32 kbps to 384 kbps)
  - Dolby Digital (56 kbps to 640 kbps) (software option VP/SWO/AC3)
  - Pass through of pre-encoded Dolby Digital or Dolby Digital Plus
  - AAC
  - Trasncode from Dolby E

## Indications

LED indication for SD SDI lock status (see Installing the Equipment > External Interfaces > SD MPEG-2 VCM > [Video Input](#): LED Indication).

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## EN8130 SD H.264 VCM Module (VP/HWO/EN8130/ENC)

### Summary of Features

#### Video Encoding

Describes the Video processing functionality available in the SD H.264 VCM.

#### Audio Encoding

Describes the Audio Inputs and Coding Modes provided by the HD H.264 VCM.

#### Vertical Blanking Interval Coding

Describes the VBI data extraction and processing capabilities of the SD H.264-2 VCM.

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## Summary of Features

### Overview

The EN8130 SD H.264 Video Compression Module (VCM) option card can encode a single standard definition [video input](#) using the H.264 algorithm.

### Inputs

The card provides an SDI video input via a BNC connector, and digital audio input via a 15-way D-type connector.

- [SDI Input](#) via a  $75 \Omega$  BNC female connector.
- Audio Input via a 15-way D-Type male connector for audio and (see [Installing the Equipment > External Interfaces > SD MPEG-2 VCM > Audio Input](#))

### Video

- SDI video input.
- Frame re-synchronization.
- Programmable bandwidth filter.
- Adaptive spatial and temporal noise reduction (software option VP/SWO/SDMP2/NR)
- H.264 Main Profile @ Level 3.0 Video Encoding (0.5 to 10 Mbps)
- H.264 High Profile @ Level 3.0 Video Encoding (0.5 to 12.5 Mbps)
- Vertical resolution: 576 or 288 (PAL), 480 or 240 (NTSC)
- Horizontal Resolution: 720, 704, 640, 544, 528, 480, 352.

### VBI Data

- World Standard Text (WST – ETS300472) (625 line only)
- Closed Captions: EIA-608, EIA-708 via SMPTE 334, or line 21.
- SMPTE 2016-3 AFD and Bar Data
- Wide Screen Signaling (WSS or WSS-AFD)

### Audio Compression

- Eight channels AES/EBU digital audio input either de-embedded from SDI or via AES/EBU input connector.
- Supported audio coding modes:
  - MPEG-1 Layer II (32 kbps to 384 kbps)
  - Dolby Digital (56 kbps to 640 kbps) (software option VP/SWO/AC3)
  - Pass through of pre-encoded Dolby Digital or Dolby Digital Plus
  - AAC
  - Trasncode from Dolby E

### Indications

LED indication for SD SDI lock status (see [Installing the Equipment > External Interfaces > SD MPEG-2 VCM > Video Input: LED Indication](#)).



## EN8130 SD H.264 Video Encoding

### Inputs

SDI Input via 75 ohm BNC connector.

Digital Audio Input via 15 way D-Type connector

### Overview

The EN8130 SD H.264 VCM can encode one standard definition video input.

The video input signal is processed into a compressed encoded bit-stream in accordance with the H.264 specification (ITU-T H.264 or ISO/IEC MPEG4 AVC).

A constant bit rate (CBR) output can be produced and may be set to between 0.5Mbps and 12.5 Mbps, depending upon the configured encoding profile. The card can also produce a variable bit rate output when operating as part of a Reflex statistical multiplexing system.

### Video Compression Functionality

The following is a summary of the Video Compression functionality available from the EN8190 HD H.264 VCM.

Function	Comments
<a href="#">H.264 Main Profile @ Level 3.0 encoding</a>	
<a href="#">H.264 High Profile @ Level 3.0 encoding</a>	See <a href="#">Transport Stream Output Overview</a> for transport stream rates.
<a href="#">Variable Seamless Mode</a>	
<a href="#">Support for a constant bit rate mode</a>	
<a href="#">Support for current reflex mode (look ahead mode 4)</a>	
<a href="#">Video Input 720x576, 25 Hz</a>	
<a href="#">Video Input 720x480, 29.97 Hz</a>	
<a href="#">Output resolutions 720, 704, 640, 544, 528, 480, 352 X 576/480 352 X 288/240</a>	Support for different resolutions including the standard set of video picture resolutions for both 625 (576/288 PAL) and 525 (480/240 NTSC) line operation.

### Test Patterns

The video pre-processor has the facility to generate a [test pattern](#).

### Loss of Video Input

On loss of video input, the SD H.264 VCM can be configured to select one of the default [test patterns](#) or a freeze frame as the output. It is also possible to configure it to stop generating the compressed video component on loss of the video input.

### Impairment Reduction

The video pre-processor provides spatial/temporal noise reduction which is motion adaptive.

Impairment Reduction	Comments
<a href="#">Motion Compensated Temporal Filtering</a>	Only available if license VP/SWO/SD/MCTF has been purchased.

## EN8180 HD MPEG-2 VCM Module (VP/HWO/EN8180/ENC)

### Summary of Features

#### Video Encoding

Describes the Video processing functionality available in the HD MPEG-2 VCM.

#### Audio Encoding

Describes the Audio Inputs and Coding Modes provided by the HD MPEG-2 VCM.

#### Vertical Blanking Interval Coding

Describes the VBI data extraction and processing capabilities of the HD MPEG-2 VCM.

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## Summary of Features

### Overview

The EN8180 HD MPEG-2 Video Compression Module (VCM) option card can encode a single high or standard definition [video input](#) using the MPEG-2 algorithm.

### Inputs

The card provides an HD-SDI video input via a BNC connector, and digital audio input via a 15-way D-type connector.

- [HD-SDI Input](#) via a  $75\ \Omega$  BNC female connector.
- Audio Input via a 15-way D-Type male connector for audio and (see [Installing the Equipment > External Interfaces > HD H.264 VCM > Audio Input](#))

### Video

- SDI video input.
- Frame re-synchronization.
- Programmable bandwidth filter.
- Motion Compensated Temporal Filtering (software option VP/SWO/HD/MCTF)
- MPEG-2 MP@ML Video Encoding (0.256 to 15 Mbps)
- 1080i x 1920, 1080i x 1440 output resolution
- 720P x 1260, 720P x 960 output resolution.
- Scene cut detection

- Ancillary Data
  - Closed Captions: EIA-608, EIA-708 via SMPTE 334.
  - Time Code
  - Generic VANC carriage (SMPTE 2038)

- **Audio Compression**
  - Eight channels AES/EBU digital audio input either de-embedded from HD-SDI or via AES/EBU input connector.
  - Supported audio coding modes:
    - MPEG-1 Layer II (32 kbps to 384 kbps)

- Dolby Digital (56 kbps to 640 kbps) (software option VP/SWO/AC3)
- Pass through of pre-encoded Dolby Digital or Dolby Digital Plus
- AAC
- Transcode from Dolby E

## Indications

LED indication for SDI lock status (see [Installing the Equipment > External Interfaces > SD MPEG-2 VCM > Video Input: LED Indication](#)).

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## EN8180 HD MPEG-2 Video Encoding

### Inputs

HD-SDI Input via 75 ohm BNC connector.

Digital Audio Input via 15 way D-Type connector

### Overview

The EN8190 HD H.264 VCM can encode one high definition video input.

The video input signal is processed into a compressed encoded bit-stream in accordance with the H.264 specification (ITU-T H.264 or ISO/IEC MPEG4 AVC).

A constant bit rate (CBR) output can be produced and may be set to between 1Mbps and 25 Mbps, depending upon the configured encoding profile. The card can also produce a variable bit rate output when operating as part of a Reflex statistical multiplexing system.

### Video Compression Functionality

The following is a summary of the Video Compression functionality available from the EN8190 HD H.264 VCM.

#### Function

[MPEG-2 MP@ML encoding](#)

[MPEG-2 MP@HL encoding](#)

[Variable Seamless Mode](#)

[Support for a constant bit rate mode](#)

[Support for current reflex mode \(look ahead mode 4\)](#)

[Video Input 720x576, 25 Hz](#)

[Video Input 720x480, 29.97 Hz](#)

[Video Input 1080x1920, 25/29.97 Hz](#)

[Video Input 720x1280, 50/59.94 Hz](#)

#### Comments

See [Transport Stream Output Overview](#) for transport stream rates.

### Test Patterns

The video pre-processor has the facility to generate a [test pattern](#).

### Loss of Video Input

On loss of video input, the HD H.264 VCM can be configured to select one of the default [test patterns](#) or a freeze frame as the output. It is also possible to configure it to stop generating the compressed video component on loss of the video input.

### Impairment Reduction

The video pre-processor provides spatial/temporal noise reduction which is motion adaptive.

### **Impairment Reduction**

#### Noise Reduction (motion adaptive)

### **Comments**

Only available if license VP/SWO/HD/MCTF has been purchased.

See also Technical Specification > HD H.264 VCM > Video > [Impairment Reduction](#).

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## **Vertical Blanking Interval (VBI) Data**

### **General**

All VBI information carriage are configurable (either enabled or disabled). The video line from which the VBI is extracted is configurable. The default is set according to the recognised standard for the VBI type.

### **VBI Lines**

Up to at least 8 VBI lines per field can be extracted. Unless otherwise stated, all VBI data are formed into one VBI transport stream packet that conforms to [ETSI EN 301 775](#) or [SCTE 127](#).

### **VBI Data**

Data can be extracted from the vertical blanking interval of the incoming video stream, processed, and then included in the output transport stream.

The following is a summary of the VBI Data functionality available from the unit.

<b>Component</b>	<b>Comments</b>
<a href="#">Video Index</a>	It is possible to extract video index and another VBI type from the same line.
<a href="#">Closed Captions</a>	Via line 21 & 284 (CEA-608C) or <a href="#">SMPTE 334</a> (extracted from VANC data - 525 Line only).
<a href="#">Teletext</a>	Up to 18 lines can be extracted per field.
<a href="#">Aspect Ratio Signalling</a>	<a href="#">WSS/WSS-AFD/AFD/AFD and Bar Data</a> via <a href="#">VANC</a>

### **VBI Data on a Separate PID**

The VBI data is packetised within MPEG-2 PES packets as specified in ETSI ETS 300-472 (teletext), ETSI EN 301 775 or SCTE 127 for all other VBI data.

Refer to Transport Stream Output > [VBI Data on a Separate PID](#) for more information.

Closed caption data, and aspect ratio signalling can also be inserted in to the compressed video elementary stream.

### **Timing**

The VCM aligns VBI data and compressed video frames within the bounds dictated by time stamping of received data, i.e. stamp the same PTS on the video and VBI that came in on the same frame.

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## **HD Ancillary Data Processing**

### **General**

Specific Ancillary (ANC) Data types can be configured on/off, to be extracted from the HD-SDI input and carried as specified depending upon the data type.

## ANC Data

The following is a summary of the ANC Data functionality available from the unit.

Component	Comments
<a href="#">Closed Captions</a>	Via SMPTE 334 (extracted from VANC data - 29.97Hz operation only) and carried in the 'Picture User data' (user_data_registered_itu_t_t35 SEI message) of the video stream as per ATSC A/72 part 1
<a href="#">Generic VANC</a>	Up to 2 MBit/s of ANC data (excluding embedded audio) can be extracted and carried in the VBI component as defined in SMPTE 2038.
Time Code	Via SMPTE 12-2 (extracted from VANC data) and carried in the elementary stream (in the pic_timing SEI message) and the transport stream adaptation layer as per ETSI TS101 154
OP-47 (Subtitles)	Teletext subtitles are extracted from ANC in accordance with OP-47 and carried in a teletext PID.

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## EN8190 HD H.264 VCM Module (VP/HWO/EN8190/ENC)

The HD H.264 VCM has a unique processing engine that extracts the maximum efficiency possible from the H.264 specification.

### Summary of Features

#### Video Encoding

Describes the Video processing functionality available in the HD H.264 VCM.

#### Audio Encoding

Describes the Audio Inputs and Coding Modes provided by the HD H.264 VCM.

#### HD Ancillary Data Processing

Describes the ANC data extraction and processing capabilities of the HD H.264 VCM.

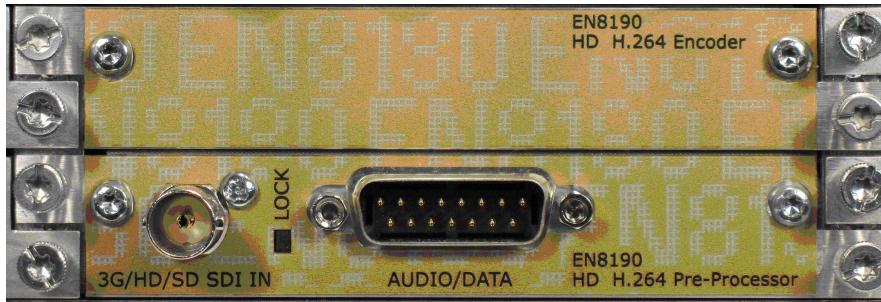
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### **Summary of Features**

#### **Overview**

The EN8190 HD H.264 Video Compression Module (VCM) is a 2 card solution to provide an option to encode a single high definition [video input](#) using the H.264 algorithm.



EN8190 HD H.264 VCM Rear Panel

## Inputs

The card provides an HD-SDI video input via a BNC connector, and digital audio input via a 15-way D-type connector.

- [HD-SDI Input](#) via a  $75\ \Omega$  BNC female connector.
- Audio Input via a 15-way D-Type male connector for audio and (see [Installing the Equipment > External Interfaces > HD H.264 VCM > Audio Input](#))

## Video

- HD-SDI video input.
- Frame re-synchronization.
- Programmable bandwidth filter.
- H.264 Main Profile @ Level 4.0 Video Encoding (1 to 20 Mbps)
- H.264 High Profile @ Level 4.0 Video Encoding (1 to 25 Mbps)
- 1080i x 1920, 1080i x 1440 output resolution
- 720P x 1260, 720P x 960 output resolution.
- Scene cut detection

## Ancillary Data

- Closed Captions: EIA-608, EIA-708 via SMPTE 334.
- Time Code
- Generic VANC carriage (SMPTE 2038)

## Audio Compression

- Eight channels AES/EBU digital audio input either de-embedded from HD-SDI or via AES/EBU input connector.
- Supported audio coding modes:
  - MPEG-1 Layer II (32 kbps to 384 kbps)
  - Dolby Digital (56 kbps to 640 kbps) (software option VP/SWO/AC3)
  - Pass through of pre-encoded Dolby Digital or Dolby Digital Plus
  - AAC
  - Transcode from Dolby E

## Indications

LED indication for HD SDI lock status (see [Installing the Equipment > External Interfaces > HD H.264 VCM > Video Input: LED Indication](#)).

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## EN8190 HD H.264 Video Encoding

## Inputs

HD-SDI Input via 75 ohm BNC connector.

Digital Audio Input via 15 way D-Type connector

## Overview

The EN8190 HD H.264 VCM can encode one high definition video input.

The video input signal is processed into a compressed encoded bit-stream in accordance with the H.264 specification (ITU-T H.264 or ISO/IEC MPEG4 AVC).

A constant bit rate (CBR) output can be produced and may be set to between 1Mbps and 25 Mbps, depending upon the configured encoding profile. The card can also produce a variable bit rate output when operating as part of a Reflex statistical multiplexing system.

## Video Compression Functionality

The following is a summary of the Video Compression functionality available from the EN8190 HD H.264 VCM.

Function	Comments
<a href="#">H.264 Main Profile @ Level 4.0 encoding</a>	
<a href="#">H.264 High Profile @ Level 4.0 encoding</a>	See <a href="#">Transport Stream Output Overview</a> for transport stream rates.
<a href="#">Variable Seamless Mode</a>	
<a href="#">Support for a constant bit rate mode</a>	
<a href="#">Support for current reflex mode (look ahead mode 4)</a>	
<a href="#">Video Input 1080x1920, 25/29.97 Hz</a>	
<a href="#">Video Input 720x1280, 50/59.94 Hz</a>	

## Test Patterns

The video pre-processor has the facility to generate a [test pattern](#).

## Loss of Video Input

On loss of video input, the HD H.264 VCM can be configured to select one of the default [test patterns](#) or a freeze frame as the output. It is also possible to configure it to stop generating the compressed video component on loss of the video input.

## Impairment Reduction

The video pre-processor provides spatial/temporal noise reduction which is motion adaptive.

Impairment Reduction	Comments
<a href="#">Noise Reduction (motion adaptive)</a>	Only available if license VP/SWO/HD/MCTF has been purchased.

See also Technical Specification > HD H.264 VCM > Video > [Impairment Reduction](#).

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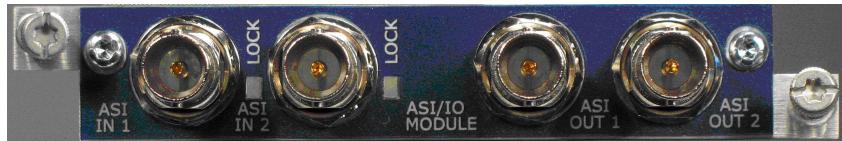
## ASI Option Module (VP/HWO/ASI/2IN2OUT)

The ASI option module provides two 75 Ω female BNC output connectors to provide the option to transmit a transport stream generated by the base chassis over ASI.

**Note...**

**In this release the ASI outputs are mirrored - the same transport stream is transmitted from both outputs.**

Two 75 Ω female BNC input connectors are also available but are not supported in this release.



*ASI Option Module Rear Panel*

The ASI option module uses the 27MHz clock and System Reference Clock (SRC) from the base chassis backplane as its frequency reference.

The output bit rate of the ASI Card is configurable up to 216Mbps. The module automatically determines if the packets are to be sent either in Burst or Byte Mode. If the TS rate is less than 70Mbps, packets are sent in byte mode. Above 70Mbps burst mode is used.

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## External Sync Input

The External Sync Input card provides a 75 Ω female BNC connector to allow an external synchronization signal to be input to the unit. This signal may then be used as the frequency reference for the units 27 MHz System Clock Reference.

The input signal may either be:

- 1 V peak to peak PAL or NTSC black and burst video signal.
- 1 V peak to peak 10 MHz square wave or sine wave reference.



*Sync Option Input Module Rear Panel*

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## Installing the Equipment

This chapter provides a guide to the suitability of an installation and gives detailed procedures for the preparation and installation of the equipment. Also details the external connectors and provides important safety information.

### Preliminary Checks

Gives general information relating to Mechanical Inspection of the unit and how to move it safely.

### Site Requirements

Describes the requirements for powering the unit and the need for lightning protection (if required).

## **Mounting in a Rack**

Gives information associated with fixing the unit into a rack and the care and positioning of cables.

## **External Interfaces**

Describes the connectors relating to the basic unit and any option modules.

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## **Preliminary Checks**

### **Mechanical Inspection**

When taking delivery of an Encoder, check the equipment items delivered against the enclosed delivery note. Inspect the equipment for damage-in-transit. If in doubt, please contact [Customer Services](#).

---

#### **WARNING!**

Removing the covers of this equipment may invalidate any warranties, cause a safety hazard or/and affect the EMC performance. Check with [Customer Services](#).

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## **Moving the Equipment Safely**

Do not place this product on an unstable cart, stand, bracket, or table. The product may fall, causing serious injury and serious damage to the product. Use only with a cart, stand, bracket or table recommended by Ericsson.

An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

Do not move or carry the equipment whilst it is still connected to the supply or other leads, is live or is in operation.

See, also:

- The Handling and Lifting section in [Read This First!](#)
- Appendices > Handling Option Cards > [Handling Option Cards](#)

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## **Site Requirements**

This chapter provides a guide to the suitability of an installation and gives detailed procedures for the preparation and installation of the equipment. Also details the external connectors and provides important safety information.

### **AC Power Supply**

Gives information relating to the AC power inlet and associated components.

### **Power Consumption**

Details the power consumption of the base chassis and each option card.

## **Protective and Technical Earths**

Describes the requirements for earthing the unit.

## **Lightning Protection**

This topic discusses the requirement of lightning protection (when appropriate).

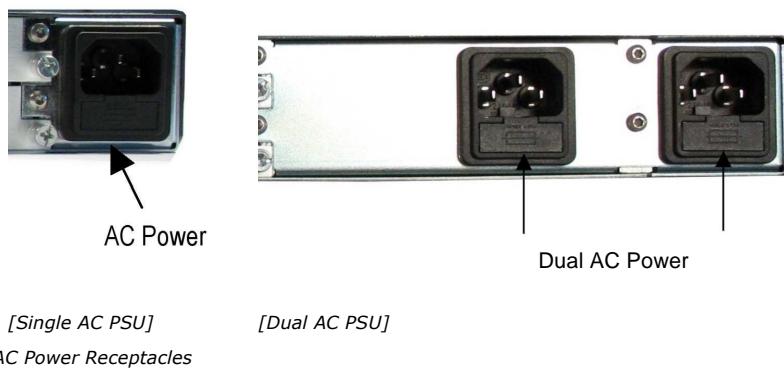
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# **AC Power Supply**

## **Variants**

This Handbook covers two Base Chassis; a single AC PSU version, and a dual AC PSU version.



## **Specification**

The equipment operates from a wide-ranging mains power supply (100-240 V AC 50/60 Hz nominal) and is designed for use in ambient air temperature in the range 0°C to +50°C. There are no links etc. to be altered for operation from different supply voltages. The full Technical Specification is given in Technical Specification > Chassis [Host] > [Power Supplies](#).

### **WARNING!**

The following points regarding power connection must be adhered to ensure safe operation of the equipment.

1. The equipment should only be operated from the type of power source indicated on the marking label. If you are not sure of the type to your business, consult your appliance dealer or local power company. Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
2. The equipment is not fitted with an AC Power On/Off switch. Ensure the supply socket outlet is installed or located near the equipment so that it is accessible.
3. Remove both sources of mains power to the dual PSU version before removing covers or moving the equipment.

## **Supply Cord**

A two-metre mains supply cord is supplied with this product. It is fitted with a moulded plug suitable for the USA, UK or mainland Europe as advised at the time of ordering.

## **Wire Colours**

The wires in the supplied cord are coloured as follows:

	<b>UK (BS 1363)</b>	<b>EUROPE (CEE 7/7)</b>	<b>USA (NEMA 5-15P)</b>
Earth	Green and yellow	Green and yellow	Green
Neutral	Blue	Blue	White
Live	Brown	Brown	Black

## Connecting the Equipment to the AC Power Supply

As there is no mains power switch fitted to this chassis, ensure the local AC power supply is switched OFF before connecting the supply cord.

Connect the mains lead to the equipment and then to the local supply.

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## Power Consumption

Rated current 4.0 – 2.0 A

Power consumption: 350W (Actual power consumption is dependant on the option cards fitted, see Table of Typical Power Consumption).

<b>Typical Power Consumption</b>		
<b>Item</b>	<b>Description</b>	<b>Power</b>
VP/CHASSIS/1AC	1U Base Chassis (AC)	40 W
VP/CHASSIS/2AC	1U Base Chassis (Dual AC)	45 W
VP/HWO/EN8190/ENC	EN8190 HD H.264 VCM	120W
VP/HWO/EN8100/ENC	EN8100 SD MPEG-2 VCM	45 W
VP/HWO/EN7100/ENC	EN7100 SD MPEG-2 VCM	45 W
VP/HWO/EN8130/ENC	EN8130 SD H.264 VCM	40 W
VP/HWO/EN8180/ENC	EN8180 HD MPEG-2 VCM	40 W
VP/HWO/ASI2IN2OUT	ASI I/O Module	12 W
VP/HWO/EXTSYNC	External Sync Option Module	0.2 W

See also Technical Specification>Chassis>[Power Supplies](#), Technical Specification>\* VCM>[Power Supplies](#).

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## Protective and Technical Earths

### Protective Earth

#### **WARNING!**

This unit must be correctly earthed as described below.

- 1. This unit must be correctly earthed through the moulded plug supplied. If the local mains supply does not have an earth conductor do not connect the unit. Contact [Customer Services](#) for advice.
- 2. Before connecting the unit to the supply, check the [supply requirements](#).

### Technical Earth

The terminal marked at the rear panel is a Technical Earth. Its use is recommended. This is NOT a protective earth for electric shock protection.



Technical Earth

The Technical Earth provides a suitable connection between the equipment and the installation to give a low impedance path at normal operating frequencies.

The terminal is provided to:

1. Ensure all equipment chassis fixed within a rack are at the same technical earth potential.
2. Eliminate the migration of stray charges when connecting between equipment.

To do this, connect a wire between the Technical Earth terminal and a suitable point on the rack.

---

### CAUTION!

It is strongly recommended that the earth terminal at the rear panel of the equipment is connected to a site Technical Earth before any external connections are made and the equipment is powered. This limits the migration of stray charges.

---

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## Lightning Protection

---

### WARNING!

If the equipment has been subject to a lightening strike or power surge, which has stopped it working, disconnect the power immediately, do not re-apply power until it has been checked for safety. If in doubt, contact [Customer Services](#).

---

Where appropriate, ensure this product has an adequate level of lightning protection. Alternatively, during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the supply outlet and disconnect the output equipment. This prevents damage to the product due to lightning and power line surges.

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## Mounting in a Rack

Gives information associated with fixing the unit into a rack and the care and positioning of cables.

## **Installing the Equipment**

**Read This First:** Read the information contained in this topic before beginning to install the equipment.

### **Care in Positioning**

This topic describes what needs to be considered before fixing the unit into a rack.

#### **Fixing**

Provides information related to the fixing of the unit in a rack.

#### **Cable Types/Installing Cables**

Tabulates the recommended cables required to maintain EMC compliance. Also describes the care required when installing the cables.

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## **Handling and Lifting**

### **Handling the Equipment**

The equipment must be handled and installed carefully and thoughtfully to prevent safety hazards and damage.

### **Lifting**

In some circumstances the unit might be awkward to lift. In which case, do not attempt to lift or move it without proper assistance or equipment. If in doubt, seek assistance.

### **Electrostatic Handling**

---

#### **WARNING!**

Static electricity can damage electronic components. To avoid damage, keep option cards in their static-protective package until you are ready to install them.

---

Refer to [Options Cards](#) for information relating to the handling of Option Modules.

## **Installing the Equipment**

Read the comments in [Read This First](#) before starting work.

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## **Care in Positioning**

### **Positioning the Unit**

**CAUTION!**

The following points must be taken in to consideration when positioning the unit.

---

1. The fans contained within this unit are not fitted with a dust/insect filter. Pay attention to the environment in which it is to be used.
2. Do not install units so that the air intake of one aligns with the outlet on another. Provide baffles and adequate spacing.

The equipment should never be placed near or over a radiator or other source of heat. It should not be placed in a built-in installation such as a rack unless proper ventilation is provided and the instructions have been adhered to.  
Allow at least 40 mm free air-space at each side of the equipment to ensure adequate cooling.  
Racks containing stacked equipment may need to be forced air-cooled to reduce the ambient temperature within the rack.

**Protection from Moisture**

Do not install this equipment in areas of high humidity or where there is a danger of water ingress.

**Cooling**

Side openings in the unit, as well as side-mounted cooling fans, are provided for ventilation. They ensure reliable operation of the product and protect it from overheating.



Airflow Through the Unit

**WARNING!**

The ventilation openings must not be blocked or covered.

---

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**Fixing****Overview**

The equipment is designed for fixed use only and has been shipped with fixing brackets suitable for a standard 19-inch rack. When installed in a rack, it should be secured using the fixing brackets. In addition, support shelves must be used to reduce the weight on the brackets. Ensure it is firmly and safely located and it has an adequate flow of free-air.

**Fixing the Unit**

Slide the unit onto the chassis supports and affix to the rack by means of an M6 x 18 mm panhead screw in each corner. A freestanding unit should be installed on a secure horizontal surface where it is unlikely to be knocked or its connectors and leads disturbed.

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**Cable Types/Installing Cables**

## Cable Types

The signal cable types (or similar) described in the following table are those recommended by Ericsson in order to maintain product EMC compliance.

Signal Type	Connector	Cable
Ethernet (Control)	RJ-45	Alcatel Data Cable FTP 7 x 0.16
Ethernet (Data)	RJ-45 Cat 5e	Belden Datatwist (S-FTP)
HD-SDI In (Video Input)	BNC	Canford Audio BBC 1/3 PSF
SDI In (Video Input)	BNC	Canford Audio BBC 1/3 PSF
Digital Audio	D-Type	Canford Audio DFT
Ext Sync	BNC	Canford Audio BBC 1/3 PSF
ASI Output	BNC	Canford Audio BBC 1/3 PSF (type 2 video cable)

## Installing Cables – Safely

Power supply cables should be routed so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cables at plugs, convenience receptacles, and the point where they exit from the appliance.

Do not run AC power cables in the same duct as signal leads.

Do not move or install equipment whilst it is still attached to the mains supply.

Ensure safety and ESD precautions are observed whilst inter-connecting equipment.

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## External Interfaces

Describes the connectors and visual indicators associated with each component of the equipment.

### Base Chassis

Identifies and describes each connector and indicator associated with the Chassis.

### EN7100 and EN8100 SD MPEG-2 VCM

Identifies and describes each connector and indicator associated with the SD MPEG-2 VCM.

### EN8180 and EN8190 HD H.264 VCM

Identifies and describes each connector and indicator associated with the HD H.264 VCM.

### ASI Option Module

Identifies and describes each connector and indicator associated with the ASI Option Module.

### External Sync Module

Identifies and describes each connector and indicator associated with the External Sync Module.

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## Chassis/Host

### General

Identifies the position of the connectors and indicators at the front and rear panels and what combinations of external interfaces are supported.

### Control Ethernet

Identifies the Ethernet Control ports located at the rear panel of the chassis and tabulates the connectors' pinout. Describes the operation of each port, and the Status and Activity indicators.

### Data Ethernet

Identifies the Ethernet Data ports located at the rear panel of the chassis and tabulates the connectors' pinout. Describes the operation of each port, and the Status and Activity indicators.

### AC Input Connector

Shows the rear panel AC connector and provides fusing information.

### USB Connector

Provides information associated with the USB connector located at the front panel.

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## General

### **External Interfaces**

The following combinations of external interfaces are supported by the chassis, (i.e. without the interface being provided by an option card):

<b>Chassis Option</b>	<b>AC Input</b>	<b>Ethernet Control</b>		<b>Ethernet Data</b>		<b>USB Test/Maintenance</b>	
		#1	#2	#1	#2	#3	#4
AC	•						
IP		•		•	•	•	•

### **1 'RU' Base Chassis Single PSU Rear Panel**

#### **WARNING!**

It is strongly recommended that the terminal marked at the rear panel of the equipment is connected to a site [Technical Earth](#) before any external connections are made and the equipment is powered. This limits the migration of stray charges.



[Control Ethernet](#)[AC Input](#)

*Location of the Ethernet and Single AC Connectors at the Rear Panel*

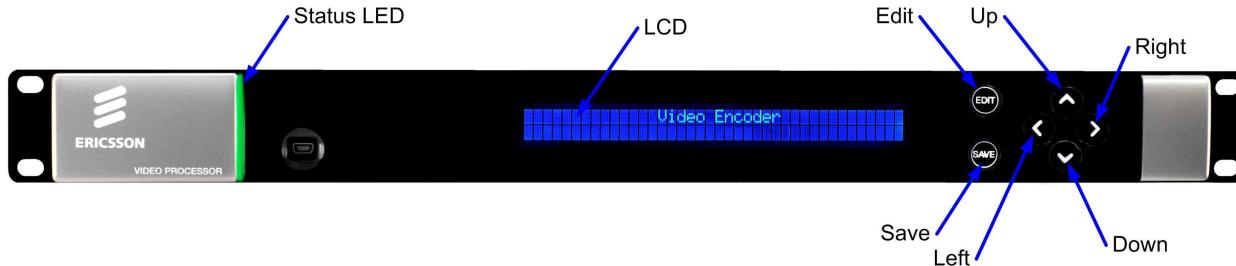
All signal connections are made via the rear panel.

**NOTE :** Single A.C. PSU version shown.

## Front Panel

### Identifying Items Located at the Front Panel

The front panel provides a 2 line by 40 character display, 6 buttons, and a red/amber/green tri-colour status LED.



*Items on the Front Panel*

### LCD

Control and status information is displayed on a 2 line by 40 character display.

### Buttons

Six buttons are provided for navigating through the front panel menus. See [Front Panel Controls and Pushbuttons](#) for more details.

### Status LED

An LED located at the front panel gives an indication of the status of the unit.

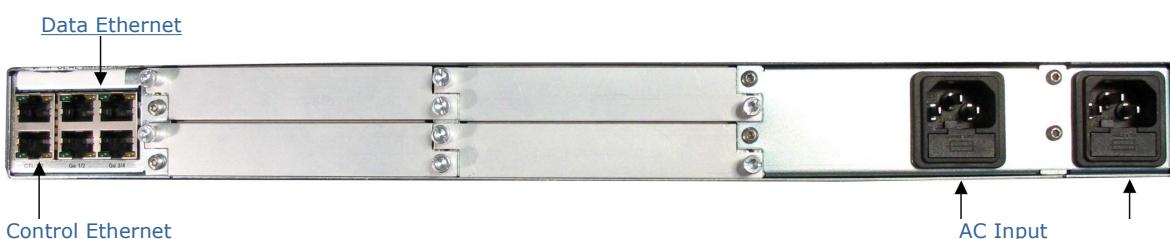
LED State	Unit Status
Off	Unit not powered
Green	No active warnings or alarms
Amber	Active warning/s, minor or major alarm/s
Red	<a href="#">Active critical alarm/s</a>

### USB Connector

This is not for customer use. Please refer to [USB connector](#).

## 1 'RU' Base Chassis Dual PSU Rear Panel

This chassis is the same as the 1 'RU' Base Chassis but with the dual PSU.



*Location of the Ethernet and Dual AC Connectors at the Rear Panel (Blanking Plates Fitted)*

A technical specification for the connections is given in Technical Specification > [Base Chassis](#).

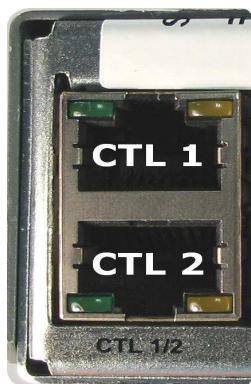
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## Control Ethernet

### Overview

The Ethernet control ports are used to connect the equipment to nCompass Control [V6.5 on] or to a PC for access to the web browser.



*Ethernet Ctrl Port Numbering*

Both connectors share the same IP address, Ctrl1 is the Primary control port, and is by default the active control port. Control Port Ctrl2 should be considered as the secondary control network as it will not respond to the Control Port IP Address unless control has been passed to it either as a result of a redundancy switch, or via a user command. The active control port switches when Ctrl1 has no link (e.g. carrier), and Ctrl2 has the link.

Refer to:

Operation and Control >Basic Functions > [Ethernet: Control](#) for Control Port Parameters.

This equipment can be controlled using a single control connection.

Item	Specification
Connector type	RJ-45 (100/1000 Base T)
Connector designation	Ctl 1/2
Pin outs	Pin 1 - Tx Out(+) Pin 2 - TX Out (-) Pin 3 - Rx In (+) Pin 6 - RX Out (-)
(Unused pins are not connected)	

### Status and Activity Indication

Each Ethernet Control Port has a rear panel mounted status LEDs associated with it to indicate link status, activity and speed as follows:

Left (Green) LED		
Port Status	Link Speed	LED Status
Active Port	No Link	Off
	100 Mbps	Flash Off x 2
	1000 Mbps	Flash Off x 3

			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Spare Port	No Link	Off	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ----- ---
	100 Mbps	Flash On x 2	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ----- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ----- ---
	1000 Mbps	Flash On x 3	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ----- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ----- ---

The Right LED flash sequence period is 1 s, with the short flash duration being 100 ms.

Right (Yellow) LED		
Link Activity	LED Status	
No Link	Off	-----
Link	On	□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
Activity	Flash	-□-□-□-□□□□□□-□-□□-□□-□□-

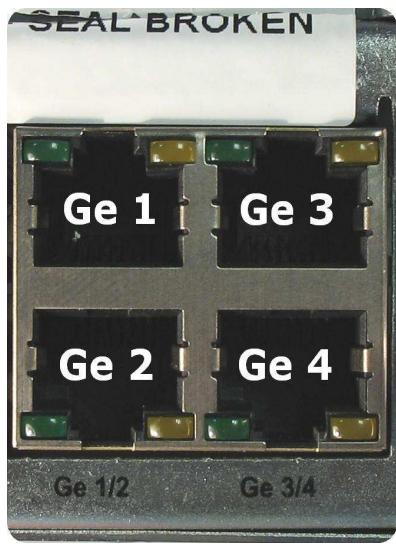
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## Data Ethernet

## Overview

The unit has four Ethernet ports for data output and will respond to ARPs, pings and Reflex PCR exchange messages for statistical multiplexing. The input of other data is NOT supported. The ports are accessible via RJ-45 connectors on the rear panel of the chassis. These are labeled Ge 1, Ge 2, Ge 3 and Ge 4.



## *Data Port Numbering*

<b>Item</b>	<b>Specification</b>
Connector type	RJ-45 (100/1000 Base T)
Connector designation	Ge 1 /2     Ge 3 /4
Pin outs	Pin 1 - Tx Out(+) Pin 2 - TX Out (-)

(Unused pins are not connected) Pin 3 - Rx In (+)  
Pin 6 - RX Out (-)

## Status and Activity Indication

Each Ethernet Data Port has a rear panel mounted status LED associated with it to indicate link status, activity and speed as follows:

## **Left (Green)**

LED

<b>Link Speed</b>	<b>LED Status</b>	
No Link	Off	-----
100 Mbps	Flash Off x 2	- □ - □ □ □ □ □ □ - □ - □ □ □ □ □ □
1000 Mbps	Flash Off x 3	- □ - □ - □ □ □ □ - □ - □ - □ □ □ □

The left LED flash sequence period is 1 s, with the short flash duration being 100 ms.

## **Right (Yellow) LED**

<b>Link Activity</b>	<b>LED Status</b>	
No Link	Off	— — — — — — — — — — — — — — — —
Link	On	□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □
Activity	Flash	— □ — □ — □ □ □ □ □ — □ □ □ — □ □

## Refer to:

Operation and Control > [Ethernet Data](#) for Control Port Parameters.

Appendices > Technical Specification > Chassis (Host) > [Data Ethernet Specification](#) for the electrical characteristics.

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## Power Requirements

## AC Connector

The AC input connector is as follows:

<b>Item</b>	<b>Description/Specification</b>
Connector	Mains input filter with CEE 22/IEC320 plug
Fusing	Fuse in live conductor in mains input filter
Fuse type	Time delay (T) 1500 A High breaking capacity (HBC)



*AC Power Inlets*

## AC Input

Refer to:

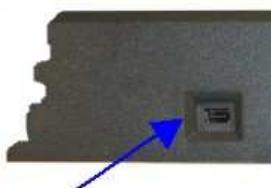
- Technical Specification > Base Chassis > [Power Supply](#)
- Installing the Equipment > Site Requirements > [AC Power Supply](#)
- Installing the Equipment > External Interfaces > Base Chassis > [AC Input Connector](#)

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## USB Connector

The USB connector on the front panel of the unit is not for customer use.



**USB Connector**

*USB Connector*

This connector is only used for Test/Maintenance purposes.

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## EN7100 and EN8100 External Interfaces

### Video Input

#### SDI Input

Standard definition digital video can be input via the 75 ohm female BNC connector labeled SD-SDI on the rear panel.

See Technical Specification > [SD MPEG-2 VCM](#) for further details.



The picture alongside shows the Video input connector: SD-SDI 75 Ω female BNC socket at the module rear panel.  
Also illustrated is the LED indication for SD SDI lock status.

The LED (marked **LOCK** at the module rear panel) is used to show the status of the module and/or incoming video signal.

*SD-SDI Input and LOCK Indicator at the Rear Panel*

## LED State Description

LED State	Description
Off	The SDI Input is not active.
Red	The SDI Input is active, but not locked.
Green	The SDI Input is active and is locked.
Alternate Red and Green	The SDI Input is active, but video of the wrong line standard is being received.

## Audio Input

### Digital Support

Digital audio may be input via the 15-way D-type connector labelled AUDIO/DATA.



The 15-way D-type supports digital audio balanced and unbalanced signals (but not at the same time).

*15-way D-type at the Rear Panel*

See [Technical Specification](#) for further details.

## Breakout Cables

The digital audio can either be balanced (AES3) or unbalanced (AES3-id) depending upon the audio breakout cable used:

Marketing Code	Part Number	Supported Audio Mode
VP/CAB/BAL	S14936 Audio Breakout Cable	Balanced Audio: 4 XLRs in + 1 BNC for ref tone out
VP/CAB/UNBAL	S14937 Audio Breakout Cable	Unbalanced Audio: 4 BNCs in + 1 BNC out for <a href="#">ref tone out</a>

**NOTE :** An audio breakout cable is NOT supplied as standard with the chassis, but must be ordered separately.

The chassis detects which cable is fitted (balanced or unbalanced) and selects appropriately.

	AES3	AES-3id
Interface	Balanced	Unbalanced
Connector	XLR-3	BNC
Impedance	110 Ω	75 Ω
Input Level	2-7 V peak to peak	1 V peak to peak

Max Input	7 V peak to peak	1.2 V peak to peak
Max Current	64 mA	1.6 mA
Min Input	0.2 V	0.32 V
Cable	Shielded Twisted Pair Coax	

### VP/CAB/BAL

This enables four balanced AES3 audio channels to be connected to the Audio/Data D-Type connector on a VCM option card.

An XLR socket is provided for each of the four digital inputs, and a  $75 \Omega$  BNC plug provides an AES3 reference signal at 3.072 Mbps. The reference signal contains a 1 kHz tone at -6 dBFS at a sample rate of 48 kHz.

The cable connections are as follows:

Connector	15-Way D-Type Pin	Description
Digital 1 - 1	Shell	Screen
Digital 1 - 2	1	Digital 1 Line
Digital 1 - 3	9	Digital 1 Return
Digital 2 - 1	11	Screen
Digital 2 - 2	10	Digital 2 Line
Digital 2 - 3	3	Digital 2 Return
Digital 3 - 1	Shell	Screen
Digital 3 - 2	4	Digital 3 Line
Digital 3 - 3	12	Digital 3 Return
Digital 4 - 1	Shell	Screen
Digital 4 - 2	13	Digital 4 Line
Digital 4 - 3	6	Digital 4 Return
Ref - 1	7	AES3 Reference (48 kHz)
Ref - Shell	15	Screen

### VP/CAB/UNBAL

This enables four unbalanced AES-3id audio channels to be connected to the Audio/Data D-Type connector on a VCM option card.

A BNC plug is provided for each of the four digital inputs, and a  $75 \Omega$  BNC plug provides an AES3 reference signal at 3.072 Mbps. The reference signal contains a 1 kHz tone at -6 dBFS at a sample rate of 48 kHz.

The cable connections are as follows:

Connector	15-Way D-Type Pin	Description
Digital 1 - 1	1	Digital 1 Line
Digital 1 - Shell	9	Screen
Digital 2 - 1	10	Digital 2 Line
Digital 2 - Shell	3	Screen
Digital 3 - 1	4	Digital 3 Line
Digital 3 - Shell	12	Screen
Digital 4 - 1	13	Digital 4 Line
Digital 4 - Shell	6	Screen
Ref - 1	7	AES3 Reference (48 kHz)
Ref - Shell	15	Screen



## EN8180 and EN8190 External Interfaces

### Video Input

## HD-SDI Input

Standard definition digital video can be input via the 75 ohm female BNC connector labeled HD-SDI on the rear panel.

See Technical Specification > [HD H.264 VCM](#) for further details.



The picture alongside shows the Video input connector: HD-SDI 75 Ω female BNC socket at the module rear panel.  
Also illustrated is the LED indication for HD SDI lock status.

The LED (marked **LOCK** at the module rear panel) is used to show the status of the module and/or incoming video signal.

*HD-SDI Input and LOCK Indicator at the Rear Panel*

## LED State Description

LED State	Description
Off	The HD-SDI Input is not active.
Red	The HD-SDI Input is active, but not locked.
Green	The HD-SDI Input is active and is locked.
Alternate Red and Green	The HD-SDI Input is active, but video of the wrong line standard is being received.

## Audio Input

### Digital Support

Digital audio may be input via the 15-way D-type connector labelled AUDIO/DATA.



The 15-way D-type supports digital audio balanced and unbalanced signals (but not at the same time).

*15-way D-type at the Rear Panel*

See [Technical Specification](#) for further details.

## Breakout Cables

The digital audio can either be balanced (AES3) or unbalanced (AES3-id) depending upon the audio breakout cable used:

Marketing Code	Part Number	Supported Audio Mode
VP/CAB/BAL	S14936 Audio Breakout Cable	Balanced Audio: 4 XLRs in + 1 BNC for ref tone out
VP/CAB/UNBAL	S14937 Audio Breakout Cable	Unbalanced Audio: 4 BNCs in + 1 BNC out for <a href="#">ref tone out</a>

**NOTE :** An audio breakout cable is NOT supplied as standard with the chassis, but must be ordered separately.

The chassis detects which cable is fitted (balanced or unbalanced) and selects appropriately.

	AES3	AES-3id
Interface	Balanced	Unbalanced

Connector	XLR-3	BNC
Impedance	110 Ω	75 Ω
Input Level	2-7 V peak to peak	1 V peak to peak
Max Input	7 V peak to peak	1.2 V peak to peak
Max Current	64 mA	1.6 mA
Min Input	0.2 V	0.32 V
Cable	Shielded Twisted Pair Coax	

### VP/CAB/BAL

This enables four balanced AES3 audio channels to be connected to the Audio/Data D-Type connector on a VCM option card.

An XLR socket is provided for each of the four digital inputs, and a 75 Ω BNC plug provides an AES3 reference signal at 3.072 Mbps. The reference signal contains a 1 kHz tone at -6 dBFS at a sample rate of 48 kHz.

The cable connections are as follows:

Connector	15-Way D-Type Pin	Description
Digital 1 - 1	Shell	Screen
Digital 1 - 2	1	Digital 1 Line
Digital 1 - 3	9	Digital 1 Return
Digital 2 - 1	11	Screen
Digital 2 - 2	10	Digital 2 Line
Digital 2 - 3	3	Digital 2 Return
Digital 3 - 1	Shell	Screen
Digital 3 - 2	4	Digital 3 Line
Digital 3 - 3	12	Digital 3 Return
Digital 4 - 1	Shell	Screen
Digital 4 - 2	13	Digital 4 Line
Digital 4 - 3	6	Digital 4 Return
Ref - 1	7	AES3 Reference (48 kHz)
Ref - Shell	15	Screen

### VP/CAB/UNBAL

This enables four unbalanced AES-3id audio channels to be connected to the Audio/Data D-Type connector on a VCM option card.

A BNC plug is provided for each of the four digital inputs, and a 75 Ω BNC plug provides an AES3 reference signal at 3.072 Mbps. The reference signal contains a 1 kHz tone at -6 dBFS at a sample rate of 48 kHz.

The cable connections are as follows:

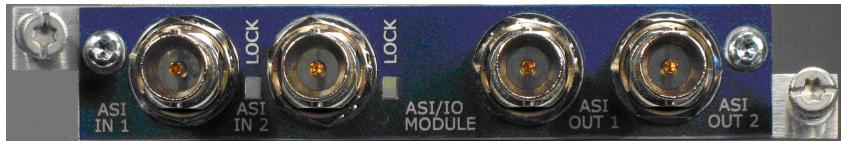
Connector	15-Way D-Type Pin	Description
Digital 1 - 1	1	Digital 1 Line
Digital 1 - Shell	9	Screen
Digital 2 - 1	10	Digital 2 Line
Digital 2 - Shell	3	Screen
Digital 3 - 1	4	Digital 3 Line
Digital 3 - Shell	12	Screen
Digital 4 - 1	13	Digital 4 Line
Digital 4 - Shell	6	Screen
Ref - 1	7	AES3 Reference (48 kHz)
Ref - Shell	15	Screen

### ASI I/O Module

The ASI option module provides two 75 Ω female BNC output connectors to provide the option to transmit a transport stream generated in the unit over ASI.

**Note:** In this release the ASI outputs are mirrored - the same transport stream is transmitted from both outputs.

Two 75 Ω female BNC input connectors are also available but are not supported in this release.



ASI Option Module Rear Panel



## Getting Started

Before any communication can be made with the unit the Control IP address needs to be configured. The topics in this section will guide you through the process.

### **Setting the IP address**

Describes how to set the required IP Address from the Front Panel.

### **IP address Ranges**

This topic shows a table of allocated IP addresses adhering to the RFC3330 range of restrictions .

### **Manual configuration via the web pages**

The unit has been designed to be configured and controlled by nCC, however a web interface is available to configure the unit (primarily for use during development).

### **Initial Configuration within nCC**

Describes the initial setup of the unit via nCC.

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## Setting the Required IP Address from the Front Panel

- Power on the unit
- Wait for initialisation to complete (approximately 1.5 minutes, depending on the number of options fitted in the chassis).
- Press the Right arrow pushbutton until the IP address is displayed, press edit and then use the up/down/right/left arrow pushbuttons to set the required IP address
  - Right/left pushbuttons will move the cursor between characters
  - Up/down pushbuttons will increase/decrease the number selected by the cursor
- Press save to store the new IP address.
- Continue and set the subnet mask and gateway address in the same way using the down pushbutton to reach each parameter.

**NOTE :** **IP Address range 192.168.10.x (subnet 255.255.255.0) is used for internal unit communications, so should not be used for external communications.**

Refer to Operation and Control > [Front Panel](#) for more details describing Front Panel features.

**NOTE :** **As with previous encoder models, a pushbutton is illuminated when there is functionality available. If a pushbutton is not illuminated, pressing it will have no effect.**

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## IP Address Restrictions

IP Addresses on the unit must adhere to RFC3330 range of restrictions as listed in the following table of allocated IP addresses.

Address Block	Present Use	Reference
0.0.0.0/8	"This" Network	[RFC1700, p4]
10.0.0.0/8	Private-Use Networks	[RFC1918]
14.0.0.0/8	Public-Data Networks	[RFC1700, p181]
24.0.0.0/8	Cable Television Networks	---
39.0.0.0/8	Reserved but subject to allocation	[RFC1797]
127.0.0.0/8	Loopback	[RFC1700, p5]
128.0.0.0/16	Reserved but subject to allocation	---
169.254.0.0/16	Link Local	---
172.16.0.0/12	Private-Use Networks	[RFC1918]
191.255.0.0/16	Reserved but subject to allocation	---
192.0.0.0/24	Reserved but subject to allocation	---
192.0.2.0/24	Test-Net	---
192.88.99.0/24	6to4 Relay Anycast	[RFC3068]
192.168.0.0/16	Private-Use Networks	[RFC1918]
198.18.0.0/15	Network Interconnect Device Benchmark Testing	[RFC2544]
223.255.255.0/24	Reserved but subject to allocation	---
224.0.0.0/4	Multicast	[RFC3171]
240.0.0.0/4	Reserved for Future Use	[RFC1700, p4]

Note: The control network and data networks should not conflict. It is suggested that the ranges for these networks are in the Private-Use Networks as listed in the summary Table.  
IP Address range 192.168.10.x (subnet 255.255.255.0) is used for internal unit communications, so should not be used for external communications.

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## Manual Configuration via the Web Pages

The Video Processor has been designed to be configured and controlled by nCC, however a web interface is available to configure the unit (primarily for use during development).

### 1) Configure Video parameters as required

Browse to web page:

Configure > System > Option Slots > Option Slot \*

Pre-processor

- Source
- Frame Rate

- Resolution

Video and VBI Encoder

- Bit rate
- The entered value is the TS rate
- Buffer Mode
- Aspect Ratio
- GOP Length
- GOP Structure- Field Frame Coding Mode

Output

- Embedded PCR

## 2) Configure Audio parameters as required

Configure > System > Option Slots > Option Slot \* > Audio  
Audio

**Note :** The number of audios available for configuration will depend upon the number of licenses.

Input

- Input Source

Encode

- Available coding standard options depend upon licenses

## 3) Configure Coding parameters

Configure any additional components required (e.g. VBI)

## 4) Configure Output Transport Streams

Configure > System > List of Outputs > Output n

Add transport stream

- Enter Required transport stream settings – on/off, TS ID, Bit rate
- Enter details of destination

- Destination IP address; either Unicast IP address of receiver data input, or multicast address
- Destination UDP Port; target UDP port (receiver needs to be configured to accept traffic from this port)
- Source UDP Port; UDP port of encoder data output (to identify where traffic originated)
- Time To live; depends upon network complexity (number of hops between units)

Add component to transport stream (Initially this will be empty)

- The elementary stream drop down menu gives all available components that are available in the chassis
- Select the required component.
- The PID will automatically be entered and incremented from the previous service PID number. This can be edited if required.

Repeat until all required components are in the TS.

- A summary of the transport stream contents is provided in the status screen on the left panel of the web page.

The services in the TS can be modified by selecting "Edit Service Name". This gives access to edit the components parameters (including PMT PID, PCR PID and component PID) or add further components.

A maximum of 6 Transport Streams can be generated and streamed from the encoder (based on one stream per VCM fitted in the chassis).

- If required additional transport streams are added and configured as previously described.

If streaming is required from both outputs, configure the other output as previously described.

- The maximum of 6 streams can be distributed between the 2 outputs.

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## Initial Configuration Within nCC

The following topics describe an example for the initial setup of the unit using nCompass Control.

### Equipment Setup

#### Autodiscovery and Device Connections

#### Get Static Parameters from the Video Processor

#### Configure Multicasts

#### First Profile

#### Equipment Status Monitor

#### Get Static Parameters with config

#### Video Processor UDP Port Numbers

#### Backwards Compatibility

#### Multiplexer

#### Multi Video Index

#### TS Bit rate Overheads for the Video Processor in nCC

#### Multi VCM Operation and Redundancy

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## Equipment Setup [nCompass]

When the Video Processor is being used as part of a system, all the configuration and control is performed via nCompass Control (nCC).

The only configuration required on the unit is to [set the Ethernet Control port parameters](#).

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## Autodiscovery and Device Connections Summary

### Autodiscovery

Describes how to use Auto Discovery to find the available units in the range of IP addresses used by the equipment

### Connections

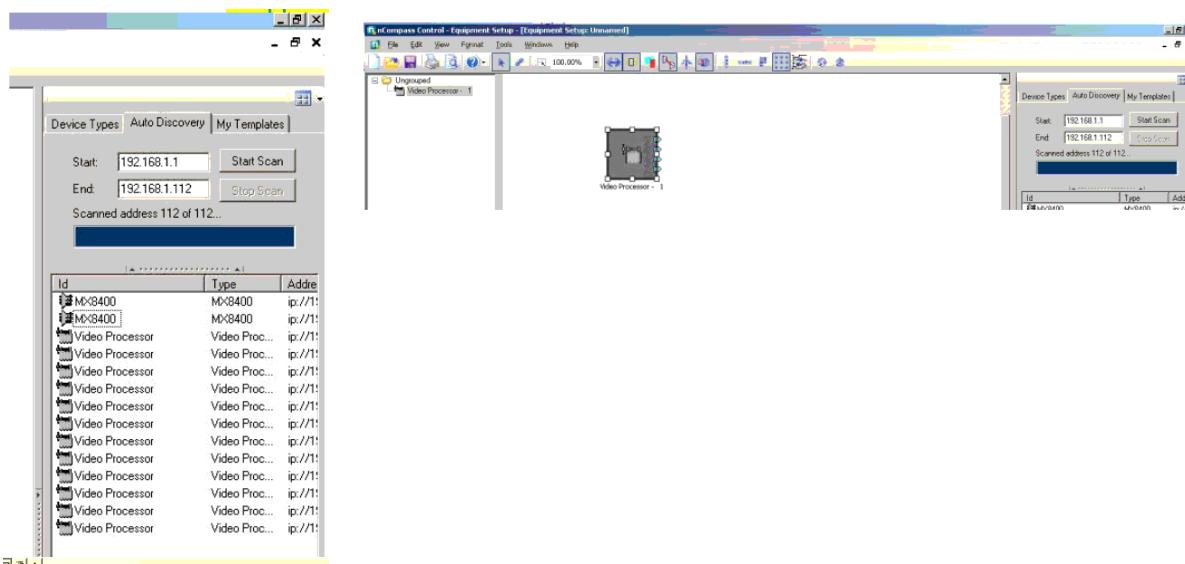
Describes the use of the Connect tool.

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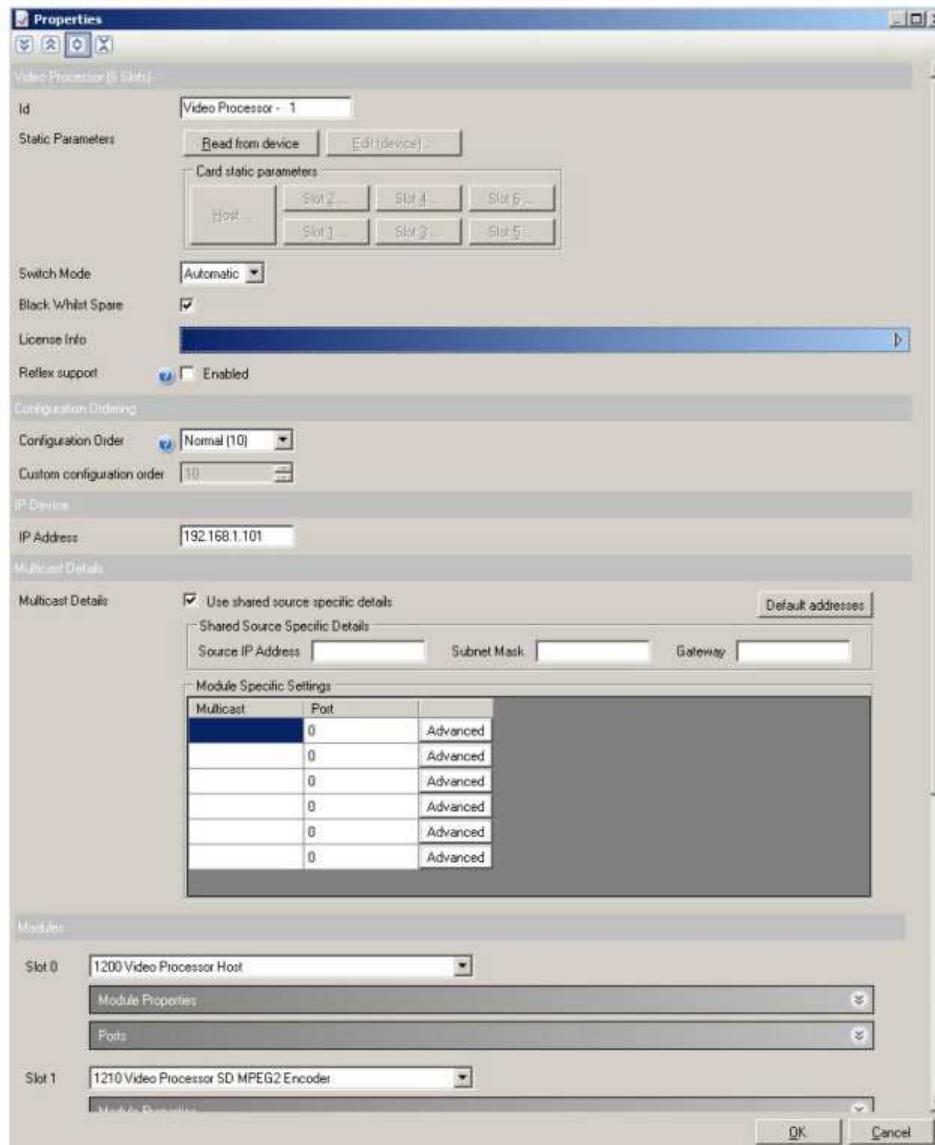
## Autodiscovery

- Within the Equipment setup: select Auto Discovery and ensure that the range of IP addresses used by the equipment is correct.
- Note all devices are listed as one Video Processor type. the modules fitted (for example EN8100 or EN8190 pre-processor and encoder cards are defined within the dev`ice).
- When the scan has completed a list of available devices is shown in table form. These devices can then be dragged and dropped onto the map.



Drag and Drop onto the Map

- Double clicking on the device in the Equipment setup shows the device properties. Check that the correct fitted modules are listed at the bottom of the properties page.
- The unit's licences can also be read from this GUI.



Properties Page

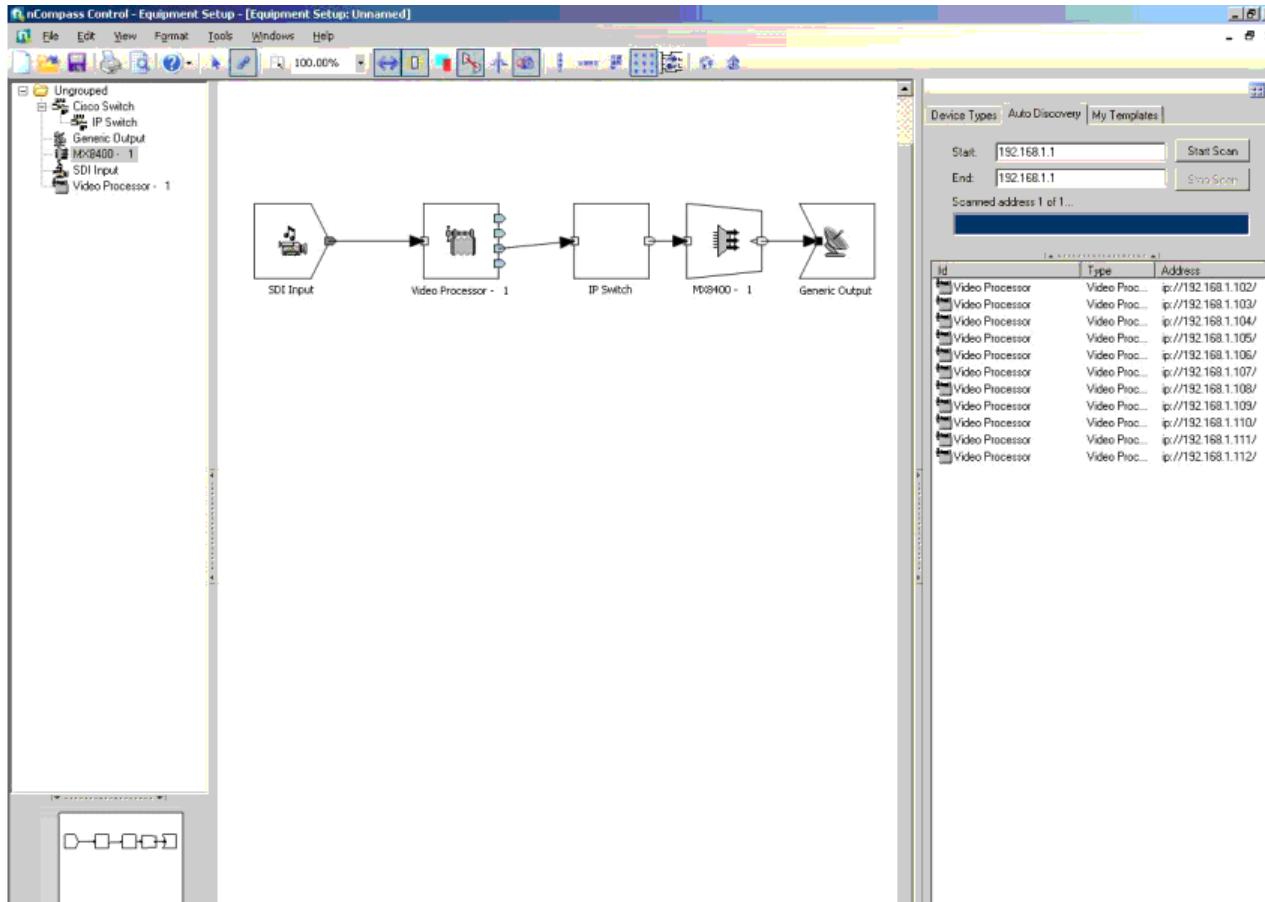
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## Connections

Using the connect tool, devices can be connected together.

**NOTE :** For the IP output of the Video Processor port 3 is used as the default and nCC will always configure Data port pair 3 and 4.



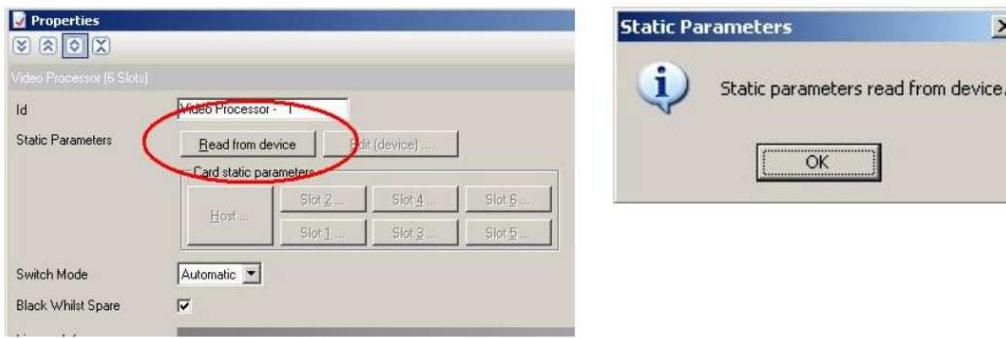
#### Connections

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## Get Static Parameters

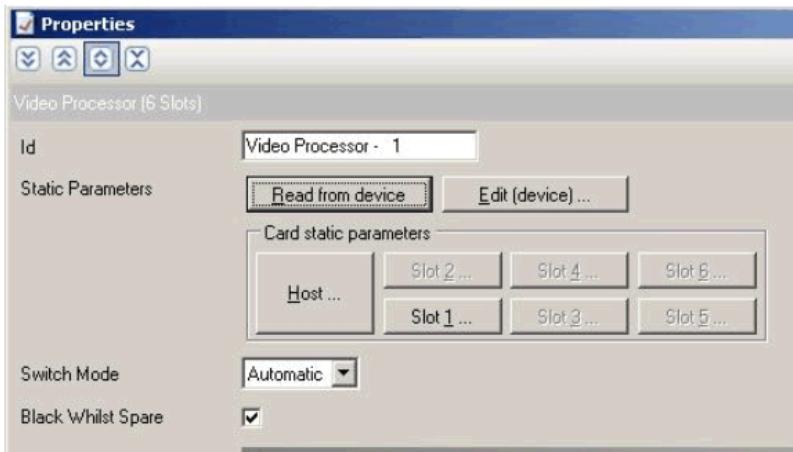
- To read the Video Processor Static Parameters, the nCC must be in Live Mode
- Open each device's properties page in turn and select the read static parameters
- A dialog box indicating success should be returned.



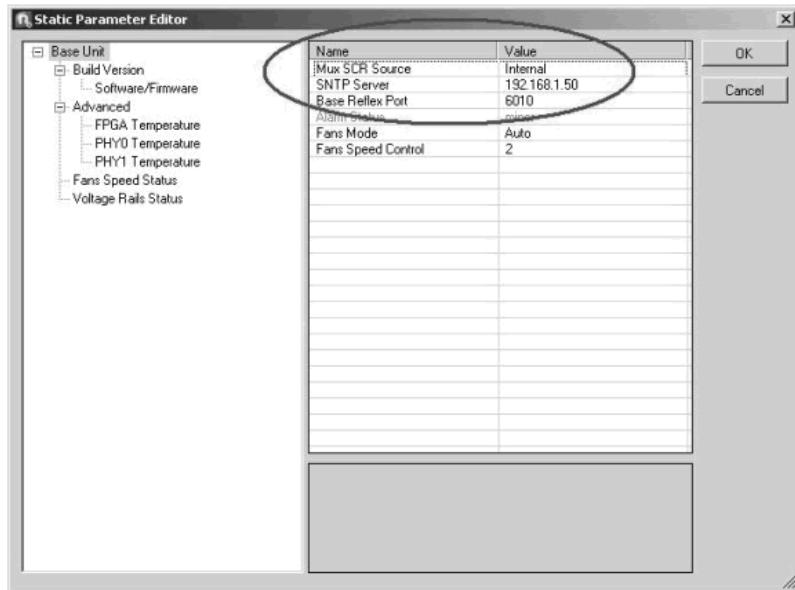
#### Static Parameters

- At this point it is possible to set certain parameters within the static parameters. These are broken down into sub-sections

for modules and host device. Examples of options that maybe updated from here are clock source and SNTP server IP address. Items that are greyed out are not amendable.



Static Parameters Properties



Static Parameter Editor

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## Configure Multicasts

- The default addresses will generate details for a source IP address and 6 multicasts. These 6 multicasts are linked to each module within the chassis (for example: slot 1 uses multicast 1). The device must be set to use share source specific details.
- From the device properties also check the Black on spare boxes.

**Multicast Details**
**Configuration Ordering**

- For Video Processors that have the reflex license the reflex support check box must be checked for nCC to route reflex components through the video processor chassis. the remote reflex check box must also be selected in nCC pre 6.8 (between nCC 6.5.5 and 6.8).
- The default remote reflex delay is 128ms.
- For systems where you do not know the history of the encoders, ensure that the data ports are each given a unique IP address, even if they are unused. This is to make sure that there are no IP address conflicts during any re-configuration.
- When the editing has completed, press OK at the bottom of the properties page.
- When all devices are configured within the Equipment Setup, save the Map and upload to the nCC server.

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## First Profile - Video

### Profile Manager

Shows the Component Type screen in Profile Manager

### Video

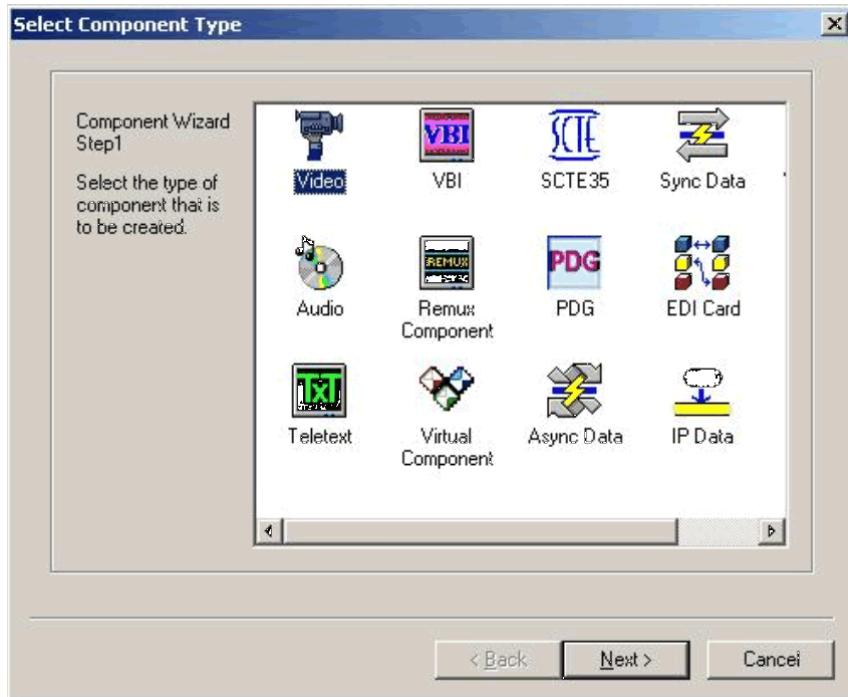
Describes how to set up the video component

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## Profile Manager

Select the required Component Type in Profile Manager:



### Select Component Type

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## First Profile - Video

### Encoder Type

Shows the Select Encoder Type screen

### Description Tab

Fill in the Description tab

### General Video Configuration

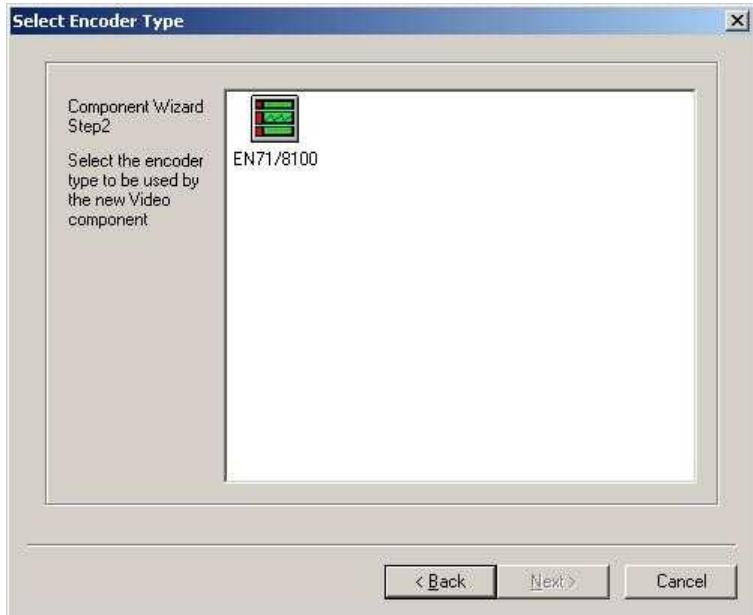
Gives general information relating to setting up the video component

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## Encoder Type

- When creating a video component for the Video Processor, select the 'EN71/8100' option for the encoder type.



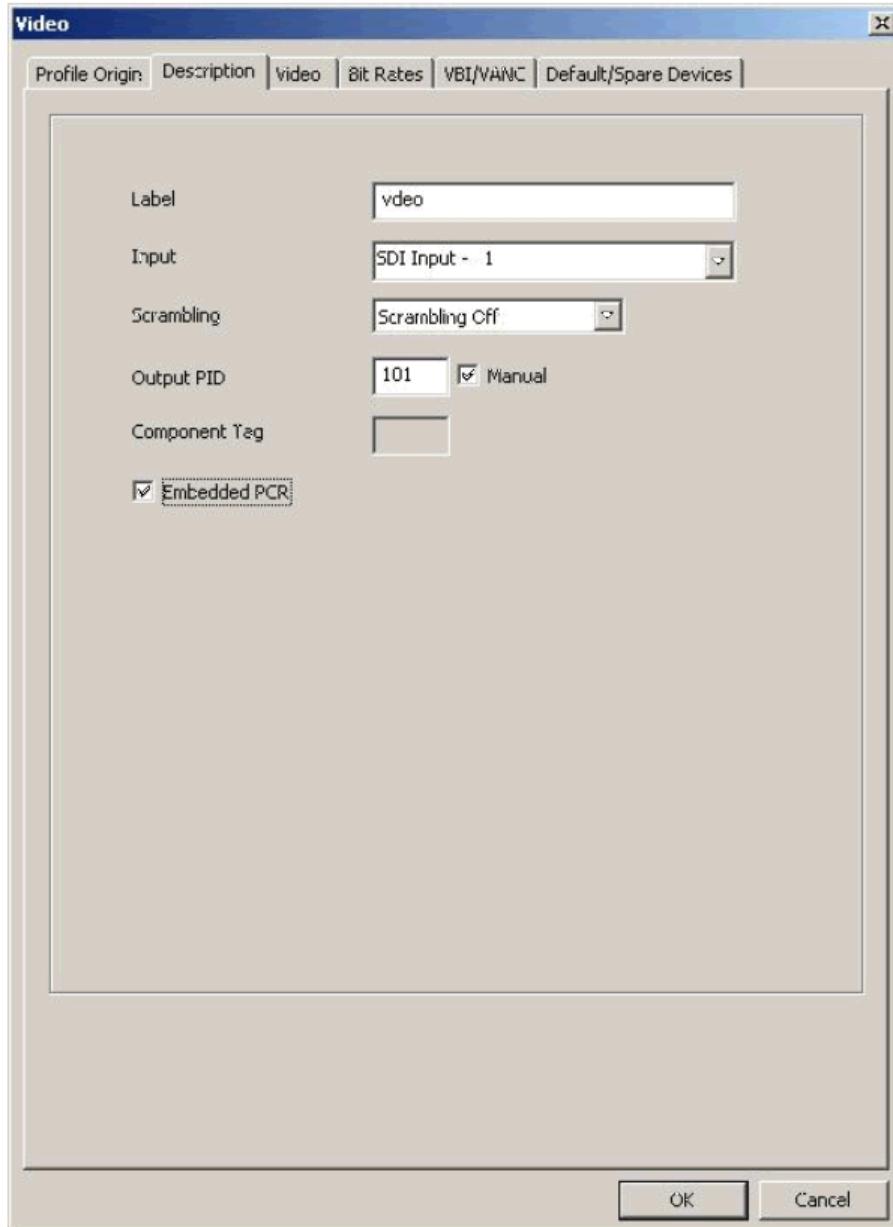
*Encoder Type*

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## Description Tab

- Complete the description tab



*Description Tag*

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## General Video Configuration

### Overview

Shows the options available on the video tab of the video component configuration pages.

### Bit rates

Shows the bit rate and operational mode options for the video component.

### VBI/VANC

Shows the options available for configuring VBI and VANC

## **Default/Spare Devices**

Shows the configuration of spare devices.

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## **Overview**

- Most options in the video tab are configured from drop down boxes within the table.



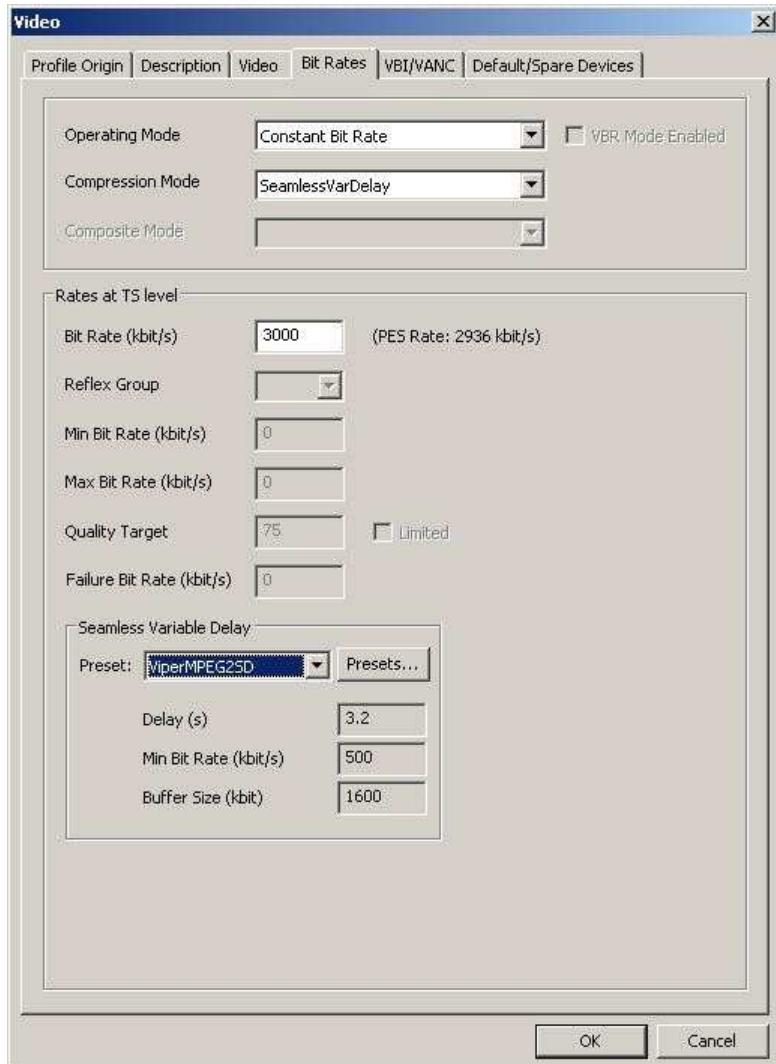
*Video Tab*

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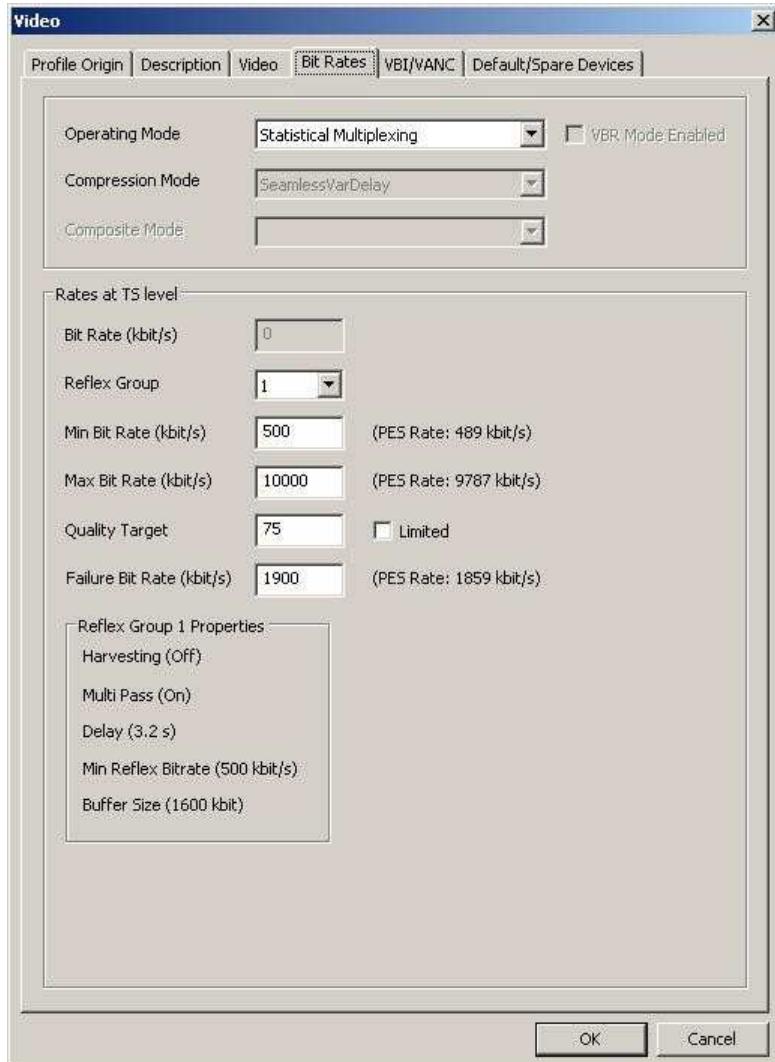
## **Bit rates**

The Bit Rates tab has Seamless Variable options. The 'ViperMPEG2SD' preset sets the delay to 3.2s and the Minimum Bit rate to 500 kbit/s, which are the recommended settings in systems.



#### Bit Rates Tab

- Configure Reflex components (enable statistical multiplexing)



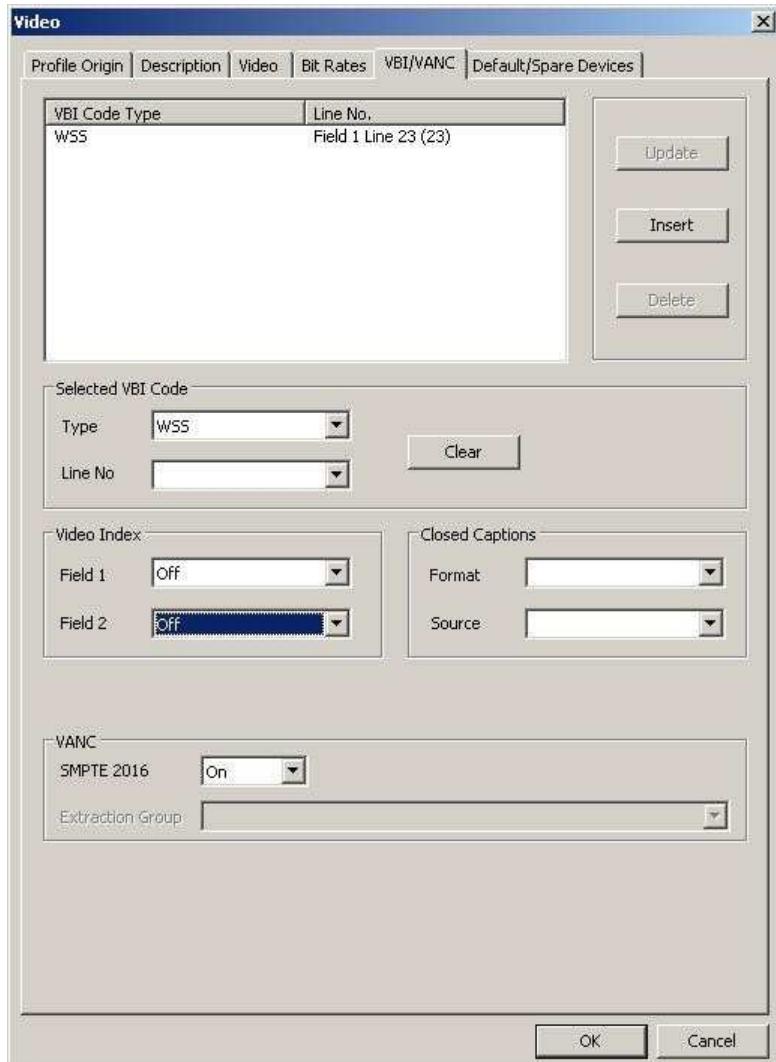
Bit Rates Tab - Statistical Multiplexing

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## VBI/VANC

- VBI settings should be configured through the VBI/VANC tab. The Video Index values must be set to Off if they are not being configured.



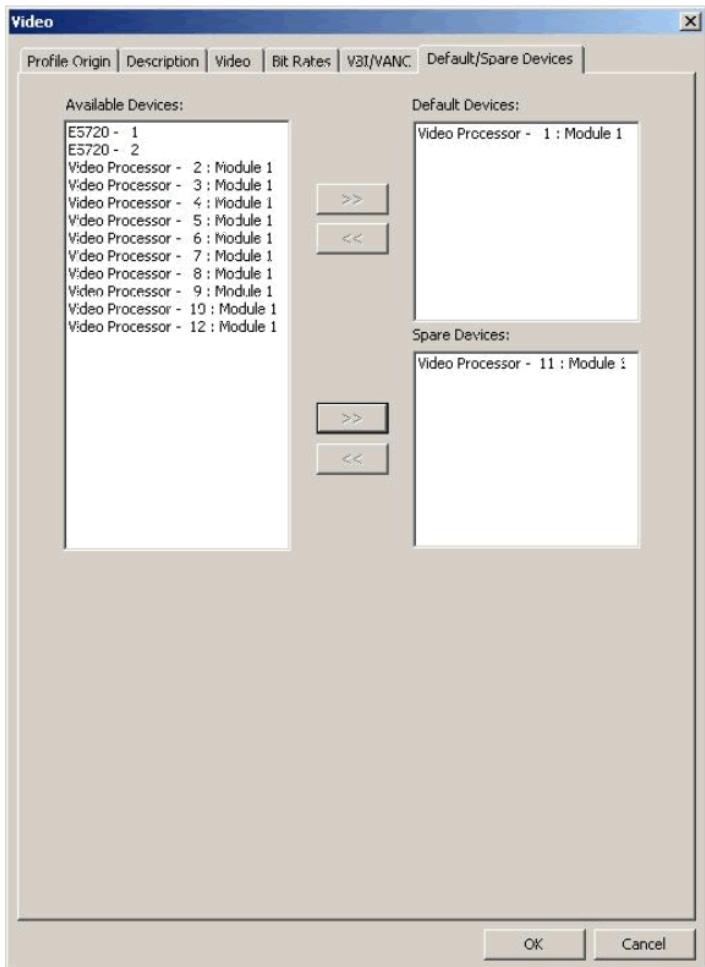
VBI/VANC Tab

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## Default/Spare Devices

- Default and Spare devices can be selected from the Default/Spare Devices tab



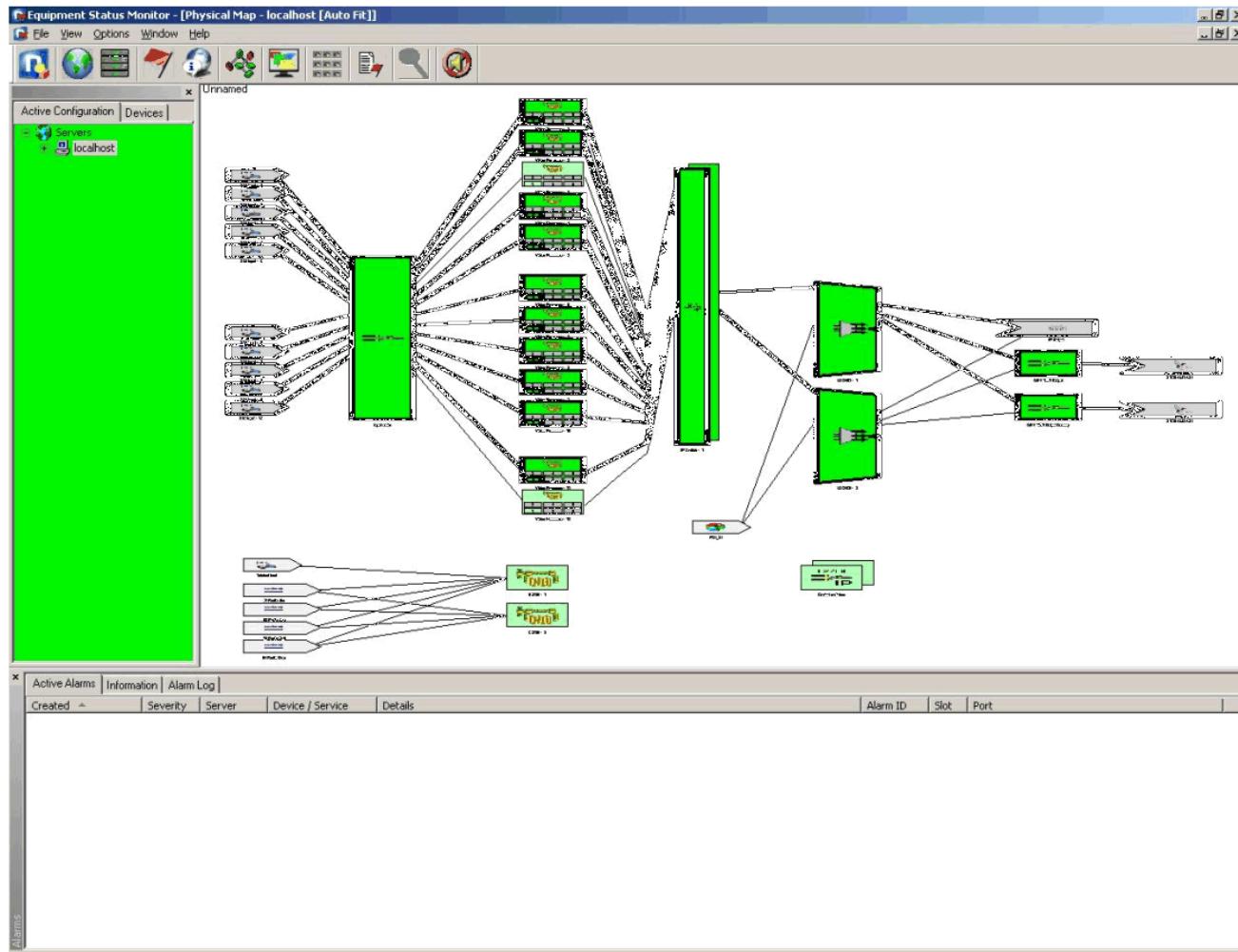
Default/Spare Tab

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## Equipment Status Monitor

- The Equipment Status Monitor displays the Video Processor units as a mixture of both chassis and modules.



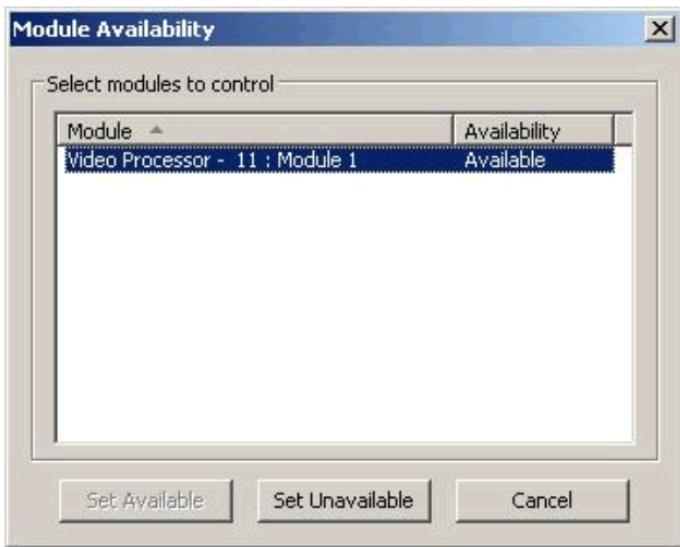
Equipment Status Monitor

- The modules are shown in the bottom half of the device.
- By right clicking on the device or the modules slightly different options appear.
- Module level switching is available only when the module is right clicked.
- Module switching will give a dialog box displaying which modules to be switched from and to.
- Device switching gives a list of available devices.



Available Devices

- As alarms can be raised against modules and at the device level, there is also a dialog box for configuring module availability.



Module Availability

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## Get Static Parameters with Configuration

### Overview

This step is required to make sure that the Static Parameters for the unit are appropriate for the system. This is especially important for systems that have moved between 525 and 625 line configurations.

- To read the Video Processor Static Parameters, the nCC must be in Live Mode
- Ensure that the required profile is running through the appropriate device and module, for a multi-module chassis, route services through all modules.
- Open the device's properties page and the read static parameters.
- A dialog box indicating success should be returned.
- When the editing has completed, press OK at the bottom of the properties page.
- Repeat for all devices.
- When all devices are configured within the Equipment Setup, save the Map and upload to the nCC server.

### Static Parameter Issues

- The default line standard within the Video Processor with a new device is 625 line 25Hz. If the unit is not configured within the device setup to black on spare, then a 525 line 29.97Hz system will report video lock alarms on the spare (or unused) devices. It is therefore recommended that the static parameters are re-read for devices when they are running a live profile such that the default settings are appropriate for that system.
- In the event of a software upgrade to the encoder, the static parameters should be re-read for upgraded devices, to ensure that there is no mis-match between the XML in nCC and in the unit.

#### Current recommended procedure for upgrading encoders:

Schedule blank profile and blank map, set nCC off, upgrade encoders, set nCC on, load map, get static parameters, save map, schedule profile.

**NOTE :** In both the above cases, if static parameters are not re-read, any changes that have been made to the defaults on the encoder will be over-written if nCC is taken off line and then re-started, as the nCC static parameters will be loaded onto the encoder. In the case of the upgraded units, this could result in loss of operation.1.

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## Video Processor UDP Port Numbers

- nCC defines the Video Processor UDP Port Number
- The range of these ports are defined within nCC during initial setup.
- Each slot within a Video Processor Chassis is automatically given its own unique Port (Encoder Port), determined by the Base Reflex Port.

Example: Slot Port

1	6010
2	6020
3	6030
4	6040
5	6050
6	6060

- These port numbers are fixed on a system basis and are re-used across all Video Processor chassis.
- These port numbers are used for both the control network and the data network (PCR exchange).

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## Backwards Compatibility

- If other Reflex v4 protocol enabled encoders are used within an Video Processor encoder system, then they should assume definition of the slot 1 encoder card
- If a Video Processor is used as a replacement in a legacy system, then the Port number used should be allocated as per the allocation with the legacy encoders.
- If a Video Processor is used as a replacement in a legacy system, it may only be a single encoder card device. That card must be fitted to slot 1.
- Mixed systems with legacy encoders should start with a base encoder UDP reflex port of 6003 for DIPNIC support. This will be defined by the Engineer installing the system.
- Reflex only works with other Video Processor MPEG-2 SD Encoders in the same statistical multiplexer pool. Not in a mixed encode type statistical multiplexer pool.

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## Multiplexer

- Each Muxlet will use the Source Port (Mux Port) number 6003
- The Source Port number 6003 shall be re-used for both the control network and data network (PCR exchange).

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## Multi Video Index

- The first video module within an encoder card should use the multi\_video\_idx of 1
- Subsequent video modules should increment in value from 1 (i.e. 2, 3, etc.)
- This range should be the same for all encoder module types, regardless of video encoder type (e.g. MPEG2, H264).
- Legacy encoder configuration should not change

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## TS Bit rate overheads for the Video Processor in nCC

- When the TS rate is changed on the output of the Video Processor, there is a small period of disruption. As the nCC dynamically allocated this rate depending on component rates, a compromise solution is that the nCC configures each multicast by default from a Video Processor at 20 MBit/s TS rate. This has a safety feature in case the TS rate required is greater than this value then the dynamic update takes precedence.

**NOTE :** In large systems it may be necessary to reduce the TS rate due to input TS rate limits in the Multiplexers.

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## Multi-VCM Operation & Redundancy

- The Video Processor spare must have sufficient duplicate VCMs to switch the entire chassis
- The Video Processor in R2AFD1 supports inter-chassis redundancy only
  - Redundant VCM must be in spare chassis, not same chassis

### Redundancy Steps:

#### Chassis Failure

- Entire Chassis switches all VCMs simultaneously

#### Single VCM failure (detected by loss of TS detected by MUX)

- nCC begins switch
- If second VCM failure detected then entire chassis switches

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## Transport Stream Output

### Output

Gives information relating to the Transport Stream from the unit.

### Transport Stream

Gives information relating to the components of the transport stream.

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## **Transport Stream Output Overview**

Gives the extent of MPEG-2 compliance and an overview of the Transport Streams.  
Describes the TS IP Output Parameters, and states the Transport Stream and Output Data rates.

## **Transport Stream Parameters**

Tabulates the parameters associated with a transport stream.

## **Transport Stream Control**

Describes the controls required for each transport stream to be carried by the IP Outputs.

## **IP Port**

Gives an overview of the IP Encapsulator functional block.

## **Pro-MPEG FEC**

Gives a brief explanation of Pro-MPEG FEC

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## **Transport Stream Output Overview**

### **MPEG-2 Compliance**

The encapsulated transport stream packets (video, audio, VBI/ANC data and PCR - 188 bytes), are fully compliant MPEG-2 transport streams (all relevant fields completed, continuity counters, PTS/DTS, adaptation fields etc.).

### **Transport Streams**

The system can form up to six output transport streams.

Transport Streams are encapsulated in either a UDP or a UDP and RTP packet and can have added Pro-MPEG FEC packets before being transmitted out of the assigned Data Ethernet port(s).

### **Pro-MPEG FEC**

Pro-MPEG FEC (Forward Error Correction) as per SMPTE 2022 1/2 can be added to the MPEG-2 Transport Stream to improve the reliability over IP networks if the relevant license (/SWO/PROFEC) has been purchased. One license instance is required by Transport Stream.

### **TS IP Output Parameters**

The user can configure the following parameters for a transport stream to be IP encapsulated and output.

Parameter	Value	Description
TS packets per UDP packet	1 to 7 [Default 7]	Defines the number of transport stream packets encapsulated in a UDP packet
TS Mode	<u>CBR</u> Off [Default]	Constant bit rate output IP Output is disabled

Output Enable	On	IP Output is enabled if the IP destination can be resolved
Dest. IP Address	aaa.bbb.ccc.ddd	The destination IP address
Source IP Port	0 to 65335 [default = 5500]	Source IP Port number
Dest. IP Port	0 to 65335 [default = 5500]	Destination IP Port number
Type Of Service	0 to 255 [Default = 4]	ToS value for inclusion in the IP header
Time To Live	0 to 240 [ Default = 15]	TTL value for inclusion in the IP header
	UDP [Default]	UDP encapsulation of TS packets
	RTP	UDP/RTP encapsulation of RTP Packets
Encapsulation Type	RTP/FEC Column	UDP/RTP encapsulation of RTP Packets with added one-dimensional FEC
	RTP/FEC Column and Row	UDP/RTP encapsulation of RTP Packets with added two-dimensional FEC

## Output Data Rate

The system is designed to support a maximum output data rate of 120 Mbps.

The bit rate of each output transport stream can be individually controlled with a resolution of 1 kps.

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## Transport Stream Parameters

The output rate of all transport streams is derived from the Base Unit's [27 MHz clock](#). This can be locked to any 27 MHz or 10 MHz clock provided by an option card, or can free run. This means that it can be locked to an option card's video input, or locked to the external sync input on the External Sync Module.

A transport stream has the following parameters associated with it.

Parameter	Values	Description
Transport Stream Name	Text string of up to 32 characters	The name of the transport stream, which is only used to identify it on the user interface(s)
SI Level	Off	No SI Tables are generated
	PAT/PMT only [Default]	Only PAT/PMT tables are generated
	PAT/PMT/CAT/SDT	Only PAT/PMT/CAT and SDT tables are generated.
PMT PID	32 to 8190 [Default 32]	The PID assigned to the PMT of this transport stream
TS Bit rate	0.1 to 216.00 Mbps	Transport stream rate in Mbps to a resolution of 10 kbps
PCR On Separate PID	Enable	PCR information is carried on its own PID
	Disable [Default]	A separate PCR PID is not generated
PCR PID	32 to 8190	The PID to be used for the PCR if PCR on separate PID is enabled
Table of Services		A list of the services that are included in the transport stream

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## Transport Stream Control

Each transport stream can be carried by the IP Outputs using the following controls.

Parameter	Range	Description
TS Pkts/UDP Packet	1 to 7	Number of transport stream packets per UDP packet
bit rate	10 kps to 216 Mbps with a resolution of 1 kbps	Output transport stream rate
Protocol	UDP, RTP, RTP/FEC Column, RTP/FEC Column and Row	
Number of Rows	4 to 20	
Number of Columns	1 to 20	
Alignment	Block Aligned, Non Block Aligned	

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## IP Port

### Overview

The IP Encapsulator within the Host Card encapsulates transport stream packets in either a UDP or a UDP and RTP packet before transmitting them out of the assigned [Data Ethernet port\(s\)](#).

### Technical Specification

Refer to Technical Specification > [IP Output Transport Stream](#) for the technical specification.

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## Pro MPEG FEC

### FEC Parameters

FEC is set up on a per-transport stream basis. The following description applies to the graphical user interface.

If the user has the appropriate license installed to use FEC then these are the parameters which can be set (with itemised lists of available values where appropriate):

Parameter	Values	Description
IP Encapsulation	UDP	UDP encapsulation of TS packets
	RTP	RTP encapsulation of TS packets
	RTP/FEC Column	UDP/RTP encapsulation of RTP Packets with added one-dimensional FEC
	RTP/FEC Column and Row	UDP/RTP encapsulation of RTP Packets with added two-dimensional FEC
Number of Rows	4 - 20	An integer between 4 and 20. See FEC constraints section for allowable ranges.
Number of Columns	1 - 20	An integer between 1 and 20. See FEC constraints section for allowable ranges.
	Block Aligned	

Alignment	Non Block Aligned
-----------	-------------------

If the user does not have a license to use FEC then the available IP Encapsulation options become UDP, RTP, RTP/FEC Column (No License) and RTP/FEC Column and Row (No License). If either of the '(No License)' options is selected then IP Encapsulation will be set to RTP and FEC will not be enabled. If subsequently the license is enabled for FEC then the '(No License)' suffix will be removed from the displayed value of IP Encapsulation

### Constraints on FEC Parameters

To promote interoperability and simplify implementation, limits are specified for values of the L (number of columns) and D (number of rows) parameters. Pro-MPEG FEC requires equipment manufacturers to support all combinations of values of L and D within these limits. The specified limits are:

Columns Only:  $(L \cdot D \leq 100)$  and  $(1 \leq L \leq 20)$  and  $(4 \leq D \leq 20)$

Rows and Columns:  $(L \cdot D \leq 100)$  and  $(4 \leq L \leq 20)$  and  $(4 \leq D \leq 20)$

### Background

Forward Error Correction or FEC, enables packets lost during transmission over IP networks to be recovered by adding extra information to the transmitted data. The particular type of FEC used on the unit is that specified by SMPTE 2022 1/2.

The key features of Pro-MPEG FEC are:

- Open standard FEC scheme.
- Increased robustness of transmission.
- Increases network reach through FEC on high loss links.
- Highly configurable depending on bandwidth vs. robustness.
- FEC transmitted separately to media stream.
- Independent of video compression standard (MPEG-2, MPEG-4).

Pro-MPEG FEC can help to solve the problems caused by missing packets. It is an open standard for protection of contribution broadcast real-time transmissions over IP networks by facilitating real-time lost packet recovery at the receive units. It permits flexible configurations for optimisation requirements. The scheme uses an RTP layer which adds timing information for sequence correction. FEC packets are transmitted in separate IP packets. It uses a matrix of media packets to calculate the FEC packets. The matrix size defined by columns (L) and rows (D). FEC packets are calculated along columns and rows using the XOR function. FEC can be 1D (Column Only) or 2D (Column and Row). Media and FEC packets are transmitted on separate IP streams with the Column FEC stream offset from media stream and has a UDP port number which is the media port number +2. The Row FEC stream is offset from Media stream and has UDP port number which is the media port number +4. This arrangement means that non-enabled FEC receivers can simply ignore FEC streams and decode the media packets. The FEC data stream is off-set from the media stream to protect against burst error loss and jitter. At the receiver, lost packets recovered using the FEC data packets. The Column FEC protects against burst errors and the Row FEC protects against random errors. Pro-MPEG FEC recovers lost packets using column and (optionally) row FEC packets using the XOR function on the remaining packets. Depending on the distribution and severity of the pack loss not all errors are recoverable.

The overhead which results from Pro-MPEG FEC transmitting extra packets depends on whether column or column and row FEC is selected and how many columns and rows there are. (Note that L = number of columns, D = number of rows.)

Column FEC: 1D FEC Overhead =  $(L + (D \cdot L)) / (D \cdot L) = 1/D + 1$

Worst case, 4 rows = 25%

Best case, 20 rows = 5%

Column and Row FEC: 2D FEC Overhead =  $(D + L + (D \cdot L)) / (D \cdot L)$

Worst case, 4 x 4 = 50%

Best case, 10 x 10 = 20%

FEC offers two methods of block alignment (also referred to as FEC linearisation) for use when generating FEC packets: Non Block Aligned and Block Aligned. Both are guaranteed of being able to correct L errors, sometimes more. The Block Aligned method can however correct 2L+2 errors; this never happens with Non-Block Aligned.

Non-Block Aligned can in theory have a lower latency at the decoder if it can be guaranteed that the mode of operation will never change.

Block Aligned linearisation is dealt with in Annex B of the Pro-MPEG Code of Practice. In Block Aligned column FEC packets are sent every D'th frame and the L Column FEC packets are played out every D slots. They are therefore evenly spread over the D\*L matrix period.

Non Block Aligned linearisation is dealt with in Annex A of the Pro-MPEG Code of Practice. In Non Block Aligned the matrix is 'skewed' for the column calculation. The L column FEC packets are played out at the end of every column plus a constant. For 'square' matrices (diamonds) where L=D then these column packets will emerge at regular intervals. For 'rectangular' diamonds they will not. In the case of a 4 column by 20 row matrix the 4 FEC packets will emerge within 16 slots, followed by a gap of 64 slots before the next 4. It therefore produces a less linear spread of packets.

Receivers which do not have FEC capability can simply ignore the FEC packets and just make use of the media packets.

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## Transport Stream

Gives information relating to the components of the transport stream.

### **Services**

This topic gives an overview of how the Service Information is formed and the Service Information Tables (MPEG-2 SI) available from the VCMs. General information about repetition rates for SI packets is also given.

### **Coded Elementary Stream**

Supported Profiles and the Output Bit Rate are given. Describes the use of PCR Placeholders.

### **Audio Output**

Gives information on Encoding and associated delay and lip sync.  
Describes the use of PCR Placeholders in audio packets.

### **Transport Packets**

General information on packetised elementary stream (PES) Packets. Also some specific information relating to video Streams. Talks about PIDs used in Transport Packet Headers.

### **VBI Data on a Separate PID**

States the conditions for VBI on a separate PID.

### **PID Assignment**

Describes the assignment of PID values.

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## Services

### **Overview**

The system is capable of forming up to six services divided between the output transport streams.

Each service can contain a maximum of 16 elementary streams. The elementary streams that make up a service can be selected from the elementary streams available from the option cards. The only restriction is that the elementary streams in a service must all reference the same [27 MHz clock](#).

An elementary stream can be included in up to eight services, but the [PID](#) of the elementary stream must be the same in all services. Only one video elementary stream can be assigned to a service, and the audio delay of audio services should be matched

to that video. Only one [PCR](#) can be associated with a service.

## Service Information Tables

The SI tables that the system generates for each individual output transport stream can be selected. The following table shows the available levels.

SI Level	Description
Off	Elementary streams only
PAT/PMT Only	PAT/PMT are generated
PAT/PMT/CAT/SDT	The listed tables are generated. The CAT will be empty as Conditional Access is not supported in this release.

Some users may not require ETR 290 compliance, so it is possible to set the [PMT](#) repetition rate to either 100 ms (default) or 500 ms.

## Formation of SI

SI packet formation and play out is the responsibility of the host card. However it is the Video Encoding module's responsibility to provide SI data fields related to the stream that it is generating.

## Repetition Rate

The repetition rate of SI packets must take in to account the output transport stream rate, otherwise the jitter introduced by the multiplexing of packets to form the transport stream can lead to the SI repetition rate being too long.

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## Coded Elementary Stream

### Overview

The compressed output streams from the module are in the form of MPEG-2 transport packets that have been encapsulated into a transport stream packet.

### Supported Profiles

The SD MPEG-2 VCM supports the following profiles:

Profile	Specification
MPEG-2 Main profile @ Main level (MP@ML)	ISO/IEC 13818

The HD MPEG-2 VCM supports the following profiles in addition to the SD MPEG-2 profile:

Profile	Specification
MPEG-2 Main profile @ Highlevel (MP@HL)	ISO/IEC 13818

The SD H.264 VCM supports the following profiles:

Profile	Specification
H.264 Main @ Level 3.0	ITU-T H.264 or ISO/IEC MPEG4 AVC
H.264 High @ Level 3.0	ITU-T H.264 or ISO/IEC MPEG4 AVC

The HD H.264 VCM supports the following profiles:

Profile	Specification
H.264 Main @ Level 4.0	ITU-T H.264 or ISO/IEC MPEG4 AVC
H.264 High @ Level 4.0	ITU-T H.264 or ISO/IEC MPEG4 AVC

## Output Bit Rate

The output rate of the transport packets are derived from the 27 MHz reference clock and are accurate to within 1 kbps of the configured bit rate (transport rate).

The output video bit rate of the VCM is configurable within ranges dictated by operating mode. The configured video rate means transport rate. The rate control operates on the transport rate.

The module supports bit-stuffing to maintain configured bit rate if the operating mode requires it.

The output of a module never exceeds the configured bit rate (or bit rate ceiling).

## PCR Placeholders

The VCMs enable a PCR placeholder to be put in the adaptation field of every video PID stream. See Appendices > Clock and Timing > [Program Clock Reference \(PCR\)](#).

## Transport Packets

The VCMs support adaptation field stuffing of transport packets for the alignment of PES packets to transport packet boundaries. Valid continuity counter values are inserted into the transport packet headers.

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## Audio Output

### Encoding

The audio encoding supports encoding at 48 kHz only.

The audio output is formed of fully compliant MPEG-2 transport packets encapsulated into a transport stream packet. The module runs in aligned mode where there are an integer number of audio frames fitted into a PES packet, therefore a PES packet will be the start of an audio packet.

The audio output rate is derived from the 27MHz reference clock.

### Lip Sync

The Video Encoding module ensures that lip sync is maintained between the limits of audio leading video by 10 ms to video leading audio by 30 ms.

### PID Assignment

The module enables a [PID](#) to be assigned to each audio channel separately, which includes the ability to assign separate PID's to every mono channel. The PID value is configurable.

## PCR Placeholders

The module enables a PCR placeholder to be put in the adaptation field of every audio PID stream. See Appendices > Clock and Timing > [Program Clock Reference \(PCR\)](#)

## Audio Reference Output Signal

A 48 kHz digital output reference signal is provided to enable an external audio encoder to be locked.

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## Transport Packets

## Packetised Elementary Stream (PES) Packets

The Video Encoding module supports adaptation field stuffing of transport packets for the alignment of PES packets to transport packet boundaries. PES streams carry the stream\_id = 0xE0.

### Transport Packet Headers

PIDs used in the transport packet headers are configurable and have valid continuity counter values inserted.

## Packetised Video Elementary Streams

The compressed video data is packetised within MPEG-2 PES packets which are configurable to be per picture or per GOP.

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## VBI Data on a Separate PID

The VBI data is packetised within MPEG-2 PES packets as specified in ETSI ETS 300-472 (teletext), ETSI EN 301 775 or SCTE 127 for all other VBI data.

The Video Encoding modules support adaptation field stuffing of transport packets for the alignment of PES packets to transport packet boundaries.

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## PID Assignment

### Assigning PIDs

If a PID has not been assigned a value (or is a value of 0) a unique PID will be allocated to that component.

### Duplicate PIDs

If a PID is given a value that is already in use, a Duplicate PID alarm is raised in the logs that identifies the transport stream and PID.

There is no facility to automatically re-assign duplicate PIDs to a unique value.

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## Operation and Control

### Introduction

Gives a general overview of how the unit is intended to be controlled and operated.

### Front Panel

Describes the operation of the front panel.

## User Access

Gives information on License keys and User Authentication.

## Ethernet Control Ports

Describes how to configure the Ethernet Control Ports.

## Ethernet Data Ports

Describes how to configure the Ethernet Data Ports.

## Option Modules

Gives information relating to the operation and control of the option modules.

## Current Configuration

Describes how the current configuration is held.

## Data Routing

Describes aspects of data packet routing.

## nCompass Control

Describes how the unit is controlled and configured as part of an nCC controlled system.

## Temperature Monitoring

### **Information on supported Protocols:**

#### SNTP

#### SNMP

#### XPO

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## **Introduction**

The unit is controlled via a pair of redundant Ethernet Control ports.

The unit is designed to be controlled either via the web browser user interface (using Internet Explorer 8 or Mozilla Firefox) or via nCompass Control.

The only configuration possible via the front panel is to set the Ethernet Control port parameters such as IP address and subnet mask. The front panel also provides the alarm status of the box.

Data can be output from the unit via the Ethernet Data ports in the form of IP encapsulated MPEG transport streams.

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## Front Panel

Describes various aspects associated with the front panel display and controls.

### Introduction

Introduces the elements located on the front panel. Also describes how to reset the unit.

### Navigate Mode

Describes the meaning and use of Navigate Mode.

### Edit Mode

Describes the meaning and use of Edit Mode.

### Front Panel Menus

Illustrates the menus available using the front panel display and pushbuttons.

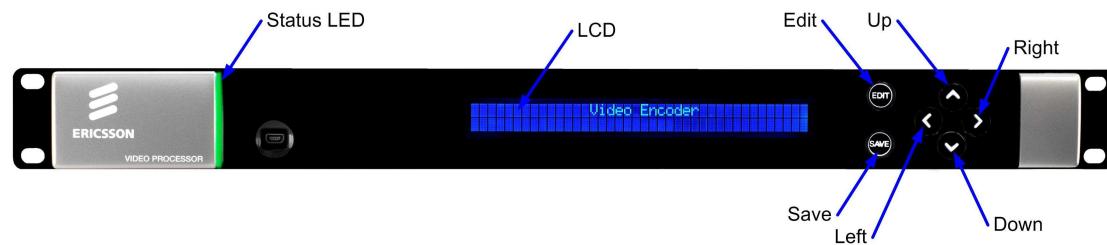
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## Introduction

### **Location on the Front Panel**

The following illustration shows the controls and Indications located on the front panel.



*Front Panel*

Operating the unit from the Front Panel is via a set of six pushbuttons.

Four pushbuttons are used to navigate the menu displayed in the LCD Display.

The Edit and Save pushbuttons allow the user to edit the remote control port settings.

Only illuminated pushbuttons link to additional pages of information

**NOTE :** See Operation and Control > Front Panel > Front Panel Menus for details of the menus displayed using the LCD Display.

### **System Reset**

The unit can be reset by simultaneously pressing the Edit and Save pushbuttons for approximately two seconds.

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## Navigate Mode

Navigate mode allows the user to move between menus and pages within menus.

The pushbuttons contain LEDs which are updated to indicate which pushbutton presses are valid as each navigation event is processed.

For example, an illuminated **Up arrow** pushbutton indicates there are pages above the current one, whilst a pushbutton that is not illuminated does not link to any additional pages or information.

Action	Result
Up arrow Pushbutton Pressed	Go to page given by uplink of current page.
Down arrow Pushbutton Pressed	Go to page given by down link of current page.
Left arrow Pushbutton Pressed	Go to page given by left link of current page.
Right arrow Pushbutton Pressed	Go to page given by right link of current page.
Edit Pushbutton Pressed	Enter Edit mode at current page (if permitted else no effect)
Save Pushbutton Pressed	No effect

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## Edit Mode

Edit mode edits the right display area and allows the user to alter control parameters that define the unit behaviour.

To enter Edit mode press the Edit pushbutton when on a page containing an editable control parameter (edit pushbutton illuminated) and the front panel is the controlling user interface.

The Front Panel returns to Navigate mode either when Edit is pressed again (abort edit with no save) or when Save is pressed (save modified parameter values).

Action	Result
Up arrow Pushbutton Pressed	Increases value of current edit parameter by one unit.
Down arrow Pushbutton Pressed	Decreases value of current edit parameter by one unit.
Left arrow Pushbutton Pressed	Moves cursor one edit parameter/parameter digit to the left (making that the current edit parameter)
Right arrow Pushbutton Pressed	Moves cursor one edit parameter/parameter digit to the right (making that the current edit parameter)
Edit Pushbutton Pressed	Aborts edit (no save/action of any parameters) and returns to Navigate mode.
Save Pushbutton Pressed	Save/action new parameter values and returns to Navigate mode.

Pushbutton LEDs are updated to indicate which pushbutton presses are still valid as each Edit pushbutton press event is processed. For example, when the Left arrow pushbutton LED is lit it indicates there are additional editable parameters to the left of the current cursor position.

There is a maximum idle period of five minutes when Edit mode will time out and return to Navigate mode.

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## Front Panel Menus

To navigate to the next level of menus press the right arrow key.

The front panel menu structure is as follows:

<b>Top Level Menu</b>	<b>To return to the top level menu press the left arrow key. <b>Use the up and down arrow keys to move between these menus.</b></b>	<b>To access these parameters press the right arrow key, and then the up and down arrow keys to move between parameters.</b>
IP address & Service name(s)		
> System		
	> Remote Control...	
	> IP Address	Set up the IP parameters for the Ethernet Control ports using the edit and up and down arrow keys.
	> Subnet Mask	
	> Gateway Address	
	> Alarms...	Lists currently active alarms.
	> Versions...	The versions list gives the overall build versions of the Host chassis, (Software Version), Assembly Date of the chassis and the Serial number.
	Host Version	
	> HW Config	This menu allows the current hardware configuration, i.e. the option cards fitted, to be accepted as the expected hardware configuration.

## Status LED

Please refer to Looking After the Unit> Troubleshooting> Handling Alarms> [Alarms](#).

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## User Access

### User Authentication

The unit supports user authentication as defined in the XPO Specification. The default for this is set to off. When set to on a username and password are required to access the web pages.

The default username (engineer) and password (password) can be changed by the user.

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## Ethernet: Control

### Overview

The Base Chassis has two Ethernet control ports that support IEEE 802.3 100BASE-TX and 1000BASE-T protocols. The control ports are accessible via RJ-45 connectors mounted on the rear panel of the unit.



#### *Ethernet Control Port Numbering*

The Ethernet control ports are used to connect the unit to a web browser or the control system (nCompass Control [V6.5 onwards]).

### Ethernet Control Port Parameters

**NOTE :** Control via the Data input ethernet ports is not supported

A single IP port is defined for all ethernet control of the chassis. The physical ports used for ethernet control are by default the control ethernet ports. The control ports can raise an alarm during abnormal operational conditions, (see Looking After the Unit > Troubleshooting > Handling Alarms > [Alarms - Control Port](#)).

The parameters defining the control ethernet port are as shown in the following table

Parameter	Values	Description	Comments
<b>Control Port Parameters</b>			
Primary Port	Ctrl1 Ctrl2 Auto	Primary control port Secondary control port Automatic selection of control port	
Auto-revert delay	0 seconds 1 to 999 seconds [default 120]	No automatic switch back to primary network Duration n seconds of how long the primary link must be restored for, before the control will switch back to it	
Default MAC Address	aa:bb:cc:dd:ee:ff	Control ports MAC address as defined by P790. (This cannot be changed by the user)	Read only parameter for information
<b>Control Port IP Configuration</b>			
IP Address	aaa.bbb.ccc.ddd	IP address of the control port	
Subnet Mask	0.0.0.0 [default] aaa.bbb.ccc.ddd 0.0.0.0 [default]	Subnet mask for the control port No defined gateway	
Gateway Address	aaa.bbb.ccc.ddd	Gateway address for packets outside the defined control	

subnet

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## Ethernet Data Ports

Four gigabit Ethernet ports are provided for data input and output.

### Data Ethernet

Describes the physical Ethernet ports, and how the ports can be configured.

### Data Input

Describes the message type supported.

### Data Output

IP encapsulated transport streams can be transmitted from the unit.

### Data Port Redundancy

Describes how Ethernet data port redundancy can be achieved.

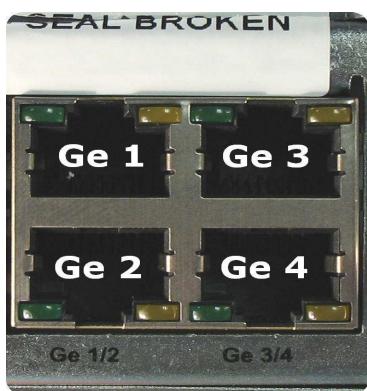
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## Ethernet: Data

### Overview

Four gigabit Ethernet ports are provided for data input and output.



*Ethernet Data Port Numbering*

### Ethernet Data Port Parameters

The data ethernet ports are configured by the parameters listed in the following table.

Parameter	Values	Description	Comments
-----------	--------	-------------	----------

Default MAC Address	aa:bb:cc:dd:ee:ff	Gex port's MAC address (This cannot be changed by the user)	Read only parameter
Link Status	Link Up (1000)	Link up and link speed 1000 Mbps	Read only parameter
	Link Up (100)	Link up and link speed 100 Mbps	
	Link Down	Link Down	
Link Up Time	days : hours : mins : secs	The length of time that the link has been up. If the link goes down this value is reset to 0	Read only parameter
TX Packets		Number of IP packets transmitted	Read only parameter
RX Packets		Number of IP packets received	Read only parameter
IP Address	aaa.bbb.cccddd	IP address of the control port	
Subnet Mask	0.0.0.0 [default]	Subnet mask for the control port	
	aaa.bbb.cccddd	No defined gateway	
Default Gateway	0.0.0.0 [default]	Gateway address for packets outside the defined subnet	
	aaa.bbb.cccddd		

The data Ethernet ports Ge 1 and Ge 2 are paired together, as are Ge 3 and Ge 4. Each port of a pair transmits the same multicasts. If the IP address, or subnet mask of a secondary port is set to 0.0.0.0, then it will be assumed that it is operating in a mirrored redundancy mode with the primary port, and therefore has the same IP address and subnet mask.

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## Data Input

The unit has four Ethernet ports for data output and will respond to ARPs, pings and Reflex PCR exchange messages for statistical multiplexing.

The input of other data is NOT supported.

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## Data Output

The unit can generate one or more output transport streams from the components produced by the option cards fitted. The output transport stream packets are encapsulated in IP packets prior to being transmitted via the Ethernet Data ports. The base chassis does not provide any other interface by which to output a transport stream.

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## Data Network Redundancy

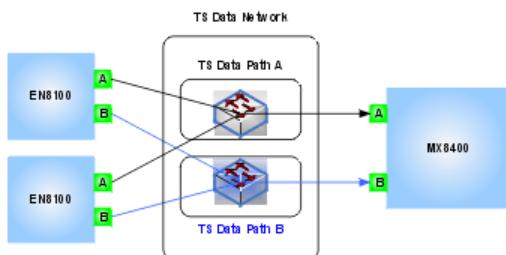
### Redundancy

**NOTE :** Both outputs of a pair are active at the same time, therefore the use of primary and secondary ports is meaningless in this configuration.

The four Ethernet data ports operate as two redundant pairs. Data 1 and 2 (Ge1 with Ge2), and Data 3 and 4 (Ge3 with Ge4).

When an output transport stream is defined, it is assigned by the user to one or other data output pairs.

Both ports are independent of each other i.e. the IP address, MAC address, subnet mask and default gateway can have different settings. Both ports are active at the same time and transmit the same data. If both ports are configured to be on the same subnet, only one port will respond to ICMP messages.



The data ports can raise an alarm during abnormal operational conditions, (see Looking After the Unit > Troubleshooting > Handling Alarms > [Alarms - Data Port](#)).

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## IP Encapsulation of MPEG Transport Streams

This topic describes how an MPEG-2 transport stream is carried over an IP link.

1 to 7 MPEG Transport Stream Packets
RTP Header (optional)
UDP (User Datagram Protocol)
IP (Internet Protocol)
Ethernet (IEEE 802)

Between one and seven MPEG transport stream packets are carried in a UDP packet. The UDP packet may optionally also contain an Real Time Protocol (RTP) header, which adds additional information such as a sequence number and a timestamp, which can help in the detection of packet loss across a network.

The UDP header is 8 bytes long, and the RTP header is 12 bytes long.

The network layer protocol is IPV4, which adds a 20 byte header to every packet.

The physical link layer is then Ethernet at either 100 Mbps or 1000 Mbps.

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## Configuring an Output Transport Stream

### Overview

The configuration of an output transport stream can be divided into the following groups:

Components

Transport Stream

Service

## Components

Components are generated by the option cards. A single component from an option card can be assigned to up to 8 services. See the sections describing each option card for details of how to configure each type of component.

## Transport Stream

The following parameters define an output transport stream:

Parameter	Range	Comments
TS Pkt	1 to 7	Defines the number of MPEG Transport Stream packets (188 bytes) which are encapsulated in every IP packet. The default is 7 because it gives the lowest data rate overhead due to the IP encapsulation.
Bit rate	10 kbps to 216 Mbps	Defines the MPEG Transport Stream bit rate.
IP Encapsulation	UDP [default] RTP RTP/FEC Column RTP/FEC Column and Row	Controls whether an RTP header is included in every IP packet.
Number of Rows	4 to 20	If the IP encapsulation is set to included FEC Column and Row, the number of rows used for FEC.
Number of Columns	4 to 20	If the IP encapsulation is set to included FEC Column (and Row), the number of columns used for FEC.
Alignment	Block Aligned Non Block Aligned Off	
SI Level	On (PAT/PMT only) On (PAT/PMT/SDT/CAT)	Controls whether a PAT and PMT is included in the output transport stream.
Dest. IP Address	xxx.xxx.xxx.xxx	The destination IP address to be used for the transport stream.
Dest. Port	0 to 65536	The destination IP port used in the UDP header.
Source Port	0 to 65536	The source IP port used in the UDP header.
TTL	1 to 255	The Time To Live value to be included in the IP header. This value is decremented every time the packet passes through a device such as a switch. When TTL reaches 0 the packet is discarded.
TOS	0 to 255	(Default 4) Defines the Type of Service field in the IP Header. The meanings of this bit field are described in RFC 1349.

## Service

Parameter	Range	Comments
PMT PID	32 to 8190	The PID to be assigned to the PMT (Program Management Table) for the service.
PCR PID	32 to 8190	The PID containing the PCR (Program Clock Reference). If the PCR is embedded within one of the components within the service, then this should be set to that components PID, otherwise the PCR PID will be used for a separate component that only carries the PCR for the service.



## Configuring Option Cards

### **EN7100 SD MPEG-2 VCM (VP/HWO/EN7100/ENC)**

Describes setting up the VP/HWO/EN7100/ENC Option Module.

### **EN8100 SD MPEG-2 VCM (VP/HWO/EN8100/ENC)**

Describes setting up the VP/HWO/EN8100/ENC Option Module.

### **EN8130 SD H.264 VCM (VP/HWO/EN8130/ENC)**

Describes setting up the VP/HWO/EN8130/ENC Option Module.

### **EN8180 HD MPEG-2 VCM (VP/HWO/EN8180/ENC)**

Describes setting up the VP/HWO/EN8180/ENC Option Module.

### **EN8190 HD H.264 VCM (VP/HWO/EN8190/ENC)**

Describes setting up the VP/HWO/EN8190/ENC Option Module.

### **ASI Input/Output Module (VP/HWO/ASI/2IN2OUT)**

Describes setting up the VP/HWO/ASI/2IN2OUT Option Module.

### **External Sync Input (VP/HWO/EXTSYNC)**

Describes setting up the VP/HWO/EXTSYNC Option Module.

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## EN7100 SD MPEG-2 VCM (VP/HWO/EN7100/ENC)

The following topics describe the setting up of the VP/HWO/EN7100/ENC Video and Audio components.

### **Video Component Configuration**

### **Audio Component Configuration**

NOTE: Changes to the configuration of the unit can cause the output to be interrupted while the new settings take effect. See Technical Specifications > EN\* VCM > Video > [Operating Times](#) for more information.

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## Video Component Configuration

The video configuration can be broken down into the following sections:

### Video Input and Pre-Processing

Details the parameters that define the video input, and the processing of the video prior to it being encoded.

### Video Encoding

Details the parameters that define the video encoding.

### Video Stream Output

Details the parameters to be included in the video stream output.

### Vertical Blanking Interval Data Configuration

Details the parameters that define the VBI data extraction and processing.

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## Video Input and Pre-Processing

### Pre-Processor

Parameter	Description
Video Source	Sets the video source used by the video encoder.
Frame Rate	Sets the frame rate of the video source.
Output On Video Loss	Controls the action taken when the video input is not locked to a video source of the defined frame rate. Possible options are: Freeze frame, Black frame, colour bars, or remove PID i.e. not output the compressed video component.
Video Resolution	Sets the size to which the input video is scaled prior to being encoded.
Horizontal Video Bandwidth	Sets the video horizontal bandwidth filter.
Vertical Video Bandwidth	Sets the video vertical bandwidth filter.
Noise Reduction	Sets the spatial and temporal noise filter strength.
Stills Detection	Detects if the video is a still picture, and encodes accordingly
Film Mode	Enables the detection of repeat fields in film material for more efficient video encoding
Half Line Removal	Remove black half lines by substituting Video data from the adjacent lines

### Video Source

This controls whether the video to be compressed comes from the SDI input, or from one of the internal test pattern generators.

Selected Option	Description
SD SDI	The standard definition SDI input is used as the video source.
Black	An internally generated black test pattern at the defined frame rate is used as the video source.
Bars and Red	An internally generated color bars pattern at the defined frame rate is used as the video source.
Moving Object	An internally generated moving pattern at the defined frame rate is used as the video source.

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## Video Encoding

<b>Video Encoder</b>	
Profile	4:2:0 MP@ML
Video Bit rate	Value entered is the TS rate
Buffer Mode	Constant Bit rate or Seamless (for Reflex operation)
Aspect Ratio	Does not effect the video encoding but rather indicates what the desired aspect ratio for the decoded picture (not the pixel). If no other mechanism such as WSS in the VBI is used, the video output image will use this aspect ratio. The supported aspect ratios are 16:9 and 4:3.
Target Quality	Defines the maximum quality of the encoding as a percentage between 30% and 100%. Reduced target effects a compromise between bit rate and quality.(Only used in reflex operation)
GOP Length	Defines the nominal distance in steps of video frames between two consecutive I frames in the encoded bit-stream.
GOP Structure	Sets the number of B frames between reference frames
Adaptive GOP	The GOP structure is automatically adapted in regard to the number of B and P frames according to the motion detected in the video.
Field Frame Encoding Mode	Selects frame or auto field/frame encoding.
Scene Cut Detection	Configuration to minimise affects caused by scene changes. An I-Frame will be inserted on scene changes, changing GOP length.
Auto Concatenation	With previously encoded source the encoder try's to align with previous reference frames
Seamless Buffer Delay	Buffer Delay for Reflex operation
Min Seamless Bit rate	Min bit rate for reflex operation
Reflex	Reflex license required to enable configuration
Lookahead Delay	The time between the lookahead encoder estimating the required bit rate and the final encoder encoding that piece of video.
AU Ctrl	Controls the data put into the TS for video Access Units (AU). This can be Random Access Indicator (RAI), AU info (ETSI 101 154) and Time Code (TC).
EN7100 Compatibility Mode	Run a EN8100 card in EN7100 mode.
Reflex Resolution Tiering Control	Not normally used - only if bit rate savings are required in lower resolutions. This will affect video quality.

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## Video Stream Output

Parameter	Description
Embedded PCR	Sets if the PCR is embedded within the video. See also <a href="#">Configuring an output Transport Stream</a>
Copyright	Sets the copyright flag in the Elementary Stream Header
Original	Sets the original flag in the Elementary Stream Header
PES Packet Per	GOP or Picture

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## Vertical Blanking Interval Data Configuration

<b>VBI</b>	
Video Index	Controls if the Aspect ratio/AFD data will be by the Video Index. The default lines are set to decode Video Index (11/324 in 25Hz, 14/277 in 29.97 Hz) The User can define the lines used to decode Video Index.
Video Index Field 1	User defined line to decode Video Index
Video Index Field 2	User defined line to decode Video Index
SMPTE 2016	This will extract Aspect Ratio, AFD and Bar data from VANC data according to SMPTE 2016
Closed Captions	The source for Closed Captions data encoded as part of the Video Stream (only applicable when Video Frame Rate is 29.97 Hz)
AFD Control	Controls if AFD data is in the video stream and action if input is lost.
AFD/Bar Data & Aspect Ratio Action on Loss	Use Default means AFD set to as coded frame and Aspect Ratio is user set value. Bar data disappears. Previous Info uses last received value.
AFD Location	Location where AFD data will be placed in the video stream. Choices are in the sequence header userdata, in the picture header userdata or in both.
Teletext Packetisation	Defines packetisation format for teletext (Normal – ETS 300-472 or Legacy – ETS 301-775)
Min # Teletext packets	The minimum number of packets sent per field, even if there is insufficient data to fill the packets
PTS on teletext	Control whether teletext PES packet header has a PTS
Timecode - TC Mode	Controls what mode the Time code (TC) is working in, either Off, external source or internally generated. Also sets what happens on loss of external source (zero or flywheel)
Timecode - TC Source	Controls the external source of Time Code auto will select the first source present in order of the drop down list.
Timecode - TC Dropframes	Only in 525 line operation controls if Time Code takes account of drop frames or not. Auto configures to external source, or to ON for internal source.
VBI Field 1, Line n	Each VBI line can be individually configured as to the format of VBI data that should be extracted from that line.
VBI Field 2, Line n	

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## Audio Component Configuration

The audio configuration for each channel can be broken down in to the following sections:

### Input

Details the parameters that define the audio input,

### Encoding

Details the parameters that define the audio encoding.

## **Dolby Metadata Presets**

These presets can be applied to any channel encoding audio into the Dolby Digital audio standard.

## **Dolby E Transcode**

This details how to configure an audio decoder and re-encode the decoded output.

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## **Audio Input**

<b>Parameter</b>	<b>Description</b>
Input Source	Sets the source used by the audio encoder.

### **Input Source Options**

This controls which input is used for the audio encoder.

<b>Selected Option</b>	<b>Description</b>
Off	No audio is produced
Mute	Audio is produced but it is silence (all samples are zero)
Test Tone	The audio input is 1kHz test tone.
Embedded 1	The audio source is de-embedded from the SDI input.
Embedded 2	The audio source is de-embedded from the SDI input.
Embedded 3	The audio source is de-embedded from the SDI input.
Embedded 4	The audio source is de-embedded from the SDI input.
Embedded 5	The audio source is de-embedded from the SDI input.
Embedded 6	The audio source is de-embedded from the SDI input.
Embedded 7	The audio source is de-embedded from the SDI input.
Embedded 8	The audio source is de-embedded from the SDI input.
Input 1	The audio source is taken from the Digital Audio Input 1
Input 2	The audio source is taken from the Digital Audio Input 2
Input 3	The audio source is taken from the Digital Audio Input 3
Input 4	The audio source is taken from the Digital Audio Input 4

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## **Audio Encoding**

<b>Parameter</b>	<b>Options</b>	<b>Description</b>
	Dolby Digital	Dolby Digital Encode, Requires /SWO/DOLBYAC3 license.
	MPEG Layer 2	MPEG Layer 2 Encode (More than two channel pairs require the /SWO/M1L2 license)
Coding Standard	AAC	AAC Encoding (Each channel pair requires a SWO/AAC license).
	HE-AAC	HE-AAC Encoding (Each channel pair requires a SWO/AAC license).
	DD Plus Pass Thru	Passthrough of pre-encoded Dolby Digital Plus Audio

DD Pass Thru	Passthrough of pre-encoded Dolby Digital Audio
DolbyE Pass Thru	Passthrough of pre-encoded DolbyE Audio
LPCM Pass Thru	Passthrough of uncompressed Audio (Linear PCM)
Audio Descr Service	MPEG1 Layer II encode of a mono audio track that describes action in the video plus a control track

**NOTE :** By default the PMT descriptor used for Dolby Digital is that defined by DVB. However via the Audio Module/Advanced settings it is possible to change this to be the descriptor defined by ATSC.

Coding Standard	Parameter	Description
Dolby Digital	Bit rate	Bit rate of audio stream
	Coding Mode	Defines the audio mode (mono/stereo etc)
	Metadata Preset	The number of the metadata preset to be applied
	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
	AU Ctrl	Controls whether AU information is included in the output audio stream.
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
	Language	Sets the language descriptor
	Bit rate	Bit rate of audio stream
MPEG-1 Layer II	Coding Mode	Defines the audio mode (mono/stereo etc)
	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
	AU Ctrl	Controls whether AU information is included in the output audio stream.
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
	Language	Sets the language descriptor
	MPEG Version	Configure MPEG-1 or MPEG-2 to be signalled.
	Copyright	Indicates if the material is copyright protected.
	Original	Indicates if source is the original or a copy
AAC	De-Emphasis	To meet the MPEG-1 Layer 2 encoding algorithm specification the audio must not have pre-emphasis applied. If the input signal does have pre-emphasis applied, a de-emphasis filter must be applied prior to encoding.
	Bit rate	Bit rate of audio stream
	Coding Mode	Defines the audio mode (only stereo supported).
	Encapsulation	MPEG ADTS or MPEG-4 LATM/LOAS encapsulation
	Temporal Noise Shaping	Enables or disables this feature
	SBR Signalling	Can be off, implicit or explicit.
	AU Ctrl	Controls whether AU information is included in the output audio stream.
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
HE-AAC	Language	Sets the language descriptor
	Bit rate	Bit rate of audio stream
	Coding Mode	Defines the audio mode (only stereo supported).
	Encapsulation	HE-AAC only supports MPEG-4 LATM/LOAS encapsulation
	Temporal Noise Shaping	Enables or disables this feature
	SBR Signalling	Can be off, implicit or explicit.
	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
	AU Ctrl	Controls whether AU information is included in the output audio stream.
DD Pass Thru	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
	Language	Sets the language descriptor
	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation

DD Plus Pass Thru	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
DolbyE Pass Thru	AU Ctrl	Controls the data put into the TS for audio Access Units (AU). AU info is defined in ETSI 101 154.
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
	Channel Mode	Sets the required number of channels
	Bit Depth	Sets the required output bit depth (word size).
	Channel Identification	Sets the channel number of the first channel in the SMPTE 302M ES
Linear Pass Thru (SMPTE 302M)	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
	AU Ctrl	Controls the data put into the TS for audio Access Units (AU). AU info is defined in ETSI 101 154.
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
	Embedded PCR	Sets PCR to be embedded in the audio stream or on a separate PID
	Lipsync Offset	Configure a delay to the audio to improve A/V synchronisation
	Language	Sets the language descriptor
	MPEG Version	Configure MPEG-1 or MPEG-2
	Copyright	Indicates if the material is copyright protected.
	Original	Indicates if source is the original or a copy
	De-Emphasis	To meet the MPEG-1 Layer 2 encoding algorithm specification the audio must not have pre-emphasis applied. If the input signal does have pre-emphasis applied, a de-emphasis filter must be applied prior to encoding.
Aud Desc Service	Action on Contrack Loss	Controls if the PID is dropped (bit rate saving) or if no action is taken
	Action when silence detected	Controls if the PID is dropped (bit rate saving) or if no action is taken
	Silence Threshold	Defines the level that the audio track is deemed as silent when the audio description service is present.
	Silence Period	Defines the time that the audio track is silent before the audio description service PID is dropped from the output.

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## Dolby Metadata Presets

Eight Dolby Metadata Presets can be configured. By default, presets 1 - 4 have the same configuration recommended by EricssonTelevision. Presets 5 - 8 are by default configured to the Dolby defaults for "Stereo Film", "Stereo Music", "Surround Film" and "Surround Music" respectively. All of the parameters in the presets can changed to the users requirements. Any of these presets can then be applied to any audio channel encoding audio in the Dolby Digital format. The table lists the parameters for each preset.

Selected Option	Description
Preset name	Name of the preset (for user information)
Dialogue normalization level	Used by a decoder to determine the level of adjustment required to achieve this the set level.
Bitstream mode	Flags the type of service in the bitstream.
Line mode compression profile	Alters the dynamic range for line output.
RF mode compression profile	This alters the dynamic range for RF output. The overall level is raised by 11dB.

Center mix level	Indicates the downmix level when there is no centre speaker. This is applied to left and right channels only.
Surround mix level	Surround downmix level for the front left and right channels when consumer has no surround speakers.
Dolby Surround mode	Flags if a two channel encoded stream contains information for a Dolby Pro-logic decode (Lt/Rt)
Audio production information exists	This indicates whether the Mixing Level and Room Type parameters exist within the bit-stream.
Mixing level	Indicates the acoustic sound pressure level of the dialogue level during the final audio mixing session.
Room type	Type and calibration of the mixing room used for the final audio mixing session.
Copyright flag	Indicates if the material is copyright protected
Original bitstream flag	Indicates if source is the original or a copy
Enable extended bitstream information	Flags if additional information is available for downmixing.
Preferred downmix mode	Indicates if the producer would prefer a Lt/Rt or a Lo/Ro downmix. Can be over-ridden by the decoder.
Lt/Rt center mix level	Indicates the required level reduction of the center channel when mixed with the L& R channels for a Lt/Rt downmix. Similar to 'Center mix level'.
Lt/Rt surround mix level	Indicates the required level reduction of the surround channels when mixed for a Lt/Rt downmix. Similar to Surround mix level'.
Lo/Ro center mix level	Indicates the required level reduction of the center channel when mixed with the L& R channels for a Lo/Ro downmix. When present this replaces the value set for the 'Center mix level'
Lo/Ro surround mix level	Indicates the required level reduction of the center channel when mixed for Lo/Ro downmix. When present this replaces the value set for the 'Surround mix level'.
Dolby Surround EX mode	Flags if the stream has been encoded in 'Surround Ex'. Only used if surround channels are present.
A/D converter type	Indicates type of A/D conversion used.
Digital de-emphasis	To meet the Dolby Digital encoding algorithm specification the audio must not have pre-emphasis applied. If the input signal does have pre-emphasis applied, a de-emphasis filter must be applied prior to encoding.
DC high pass filter enable	Removing the DC component can lead to more efficient encoding, but there is a risk that signals that do not reach 100% PCM may exceed this after filtering and therefore must be clipped.
Bandwidth low-pass filter enable	Remove high frequency signals before encoding. The filter removes frequencies that would not normally be encoded.
Low-frequency effects low pass filter enable	Apply a 120 Hz low pass filter prior to an encode. Should only be switched off if it is known that there are no frequencies above 120 Hz.
Surround attenuation enable	Attenuate surround channels by 3 dB before encoding. Theatrical and consumer mixing rooms use different levels for the surround channels, and this can be used to compensate.
Surround phase shift enable	Apply a phase shift of 90 degrees to the surround channels. This simplifies the decode process for producing a 'Lt/Rt' downmix.

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## Dolby E Transcode

A Dolby E encoded audio input can be decoded and subsequently re-encoded using a different coding algorithm if a /VP/SWO/DOLBYE/DEC license is available.

The following parameters configure the audio decoder:

Parameter	Description
Decoder Main Input	Specifies the main decoder input source, ie, the source of compressed (Dolby E) audio frames. Set to 'Off' to disable the audio decoder.
Decoder Switchout Input	This source is used when Dolby E 'switchout' is active. This input must always carry uncompressed audio (linear PCM).

Decoder Type	Can only be set to 'Dolby E' at present. When set to 'On', the main input is passed through to program outputs 1-4 if compressed audio is not detected at the input (see diagram below).
<u>PCM Bypass</u>	When set to 'Off', program outputs 1-4 are replaced with silence if compressed audio is not detected at the input. Program outputs 5-8 are always replaced with silence when compressed audio is not detected at the input.
<u>Switchout</u>	When set to 'Auto', uncompressed audio on the 'switchout' input is passed through to program output 1 if compressed audio is not detected at the input (see diagram below). When set to 'Off', the 'switchout' input is never used.

**Decoder Status**

When the decoder is enabled, the decoder reports whether it is locked to a valid compressed audio (Dolby E) stream. A valid stream is defined as follows:

- Compressed (Dolby E) audio frames are embedded in the AES3 data according to SMPTE 337M.
- The Dolby E frame must be correctly formatted with a valid CRC.
- For Dolby E, the video frame rate indicated in the Dolby E stream must match the current video frame rate used by the video encoder. An alarm is generated if the frame rates do not match.

The decoder also reports if PCM bypass and/or switchout are active.

The Dolby E program configuration, video frame rate and bit depth are reported when the decoder is locked to a valid Dolby E stream.

It is possible to view the Dolby metadata associated with each Dolby E program by navigating to Audio Module N -> Audio Decode M -> Metadata Status -> Metadata Status (Program X) menu.

It should be noted that metadata status updates relatively infrequently (approximately every 10 seconds) and consequently may not always match the current input metadata.

The following parameters configure an audio encode of the decoder output:

Parameter	Description
Input Source	Specifies the encoder input source. For audio transcode, the input source should be set to 'Decoder 1 (Audio Module N)', where N is the audio module number (1 on the EN8100, 1 or 2 on the EN8190). Set to 'Off' to disable the encoder.
Dolby E Program	This is used to select the program output (1 to 8) from the Dolby E decoder. For example, for a 5.1+2 Dolby E stream, then program 1 contains the 5.1 stream and program 2 contains the 2.0 stream. It is possible to route the same Dolby E program to multiple encoders if desired. If the specified Dolby E program output is not present in the Dolby E stream, then the encoder input is replaced by silent audio and an alarm is generated.

The parameters listed in the table below control downmixing at the input to the encoder, if it is required to match coding modes. By default downmix is controlled by the Dolby metadata from each decoder output as each Dolby E program has its own associated Dolby metadata. However it is possible to override the Dolby metadata parameters with user-specified (fixed settings) if desired.

Parameter	Description
Downmix metadata override	Set to 'On' to always override the downmix parameters in the metadata with fixed (user-specified) parameters. Set to 'Off' to use the metadata values (if they exist).
Downmix metadata reversion mode	Specifies the behaviour on loss of metadata from the decoder output. Set to 'Use fixed settings' to use the user-specified parameters when metadata doesn't exist. Set to 'If available, maintain last received metadata values, otherwise use fixed settings'.
Downmix type	Specifies the downmix type. This setting is always used (the preferred downmix type in the Dolby metadata is ignored, even if metadata override is set to 'Off'). 'Lo/Ro' is a downmix that is suitable for playback on a stereo hi-fi or headphones. 'Lt/Rt' is a downmix that is compatible with Dolby Pro Logic receivers.
Centre mix level	Sets the centre channel mixing levels when downmixing to L/R channels (-3.0 dB, -4.5 dB or -6.0 dB).
Surround mix level	Sets the surround channel mixing levels when downmixing to L/R channels (-3.0 dB, -4.5 dB or zero gain).

When transcoding to Dolby Digital there are the following additional controls

Parameter	Description
Metadata controls encoding mode	Override default coding mode with coding mode indicated in decoder program configuration or live metadata (if present). When set to 'On', the encoder will use the same coding mode indicated by the decoder metadata. Note it is not possible to obtain a 5.1 encoder output unless this option is enabled.

	When set to 'Off', the user-specified coding mode always applies. For example if the coding mode is set to 2/0 and the decoder output is 5.1, a downmix from 5.1 to 2/0 will be performed.
	Determine which metadata parameters are overridden by preset metadata, even if live metadata is present. 'Off' will always use the decoder metadata (if present).
Override Metadata Parameters	'All' will override all metadata parameters with the user-specified metadata preset. 'Compression Profile' will override the compression/ dynamic range profile with the values in the preset. 'Dialogue Normalization' will override the dialnorm parameter in the metadata with the value in the preset. 'Comp Profile and Dialnorm' will override both the compression/dynamic range profile and the dialnorm parameter with the values in the preset.
	Determines which metadata is used upon loss of live metadata.
Metadata Reversion Mode	'Last Used' will revert to the last values in the decoded bitstream. If no valid values have ever been present in the decoded bitstream then the preset is used. 'Preset' will revert to the user-specified preset.
Metadata Preset	Dolby metadata preset number (1 to 8).

When one Dolby Digital encoder is enabled, it is only possible to enable one other encoder (either Dolby Digital or MPEG-1 Layer II). Only one of the Dolby Digital encoders may be configured to allow 5.1 encoding, ie, metadata controls coding mode can only be enabled on one encoder.

Consequently it is only possible to transcode two programs in the Dolby E stream if one of the encoders is Dolby Digital. It is possible to transcode from a 5.1+2 Dolby E stream to 5.1 Dolby Digital and 2.0 MPEG-1 Layer II, or from a 5.1+2 Dolby E stream to 5.1 Dolby Digital and 2.0 Dolby Digital

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## EN8100 SD MPEG-2 VCM (VP/HWO/EN8100/ENC)

The following topics describe the setting up of the VP/HWO/EN8100/ENC Video and Audio components.

### Video Component Configuration

### Audio Component Configuration

NOTE: Changes to the configuration of the unit can cause the output to be interrupted while the new settings take effect. See Technical Specifications > EN\* VCM > Video > [Operating Times](#) for more information.

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## EN8130 SD H.264 VCM (VP/HWO/EN8130/ENC)

The following topics describe the setting up of the VP/HWO/EN8130/ENC Video and Audio components.

### Video Component Configuration

## Audio Component Configuration

NOTE: Changes to the configuration of the unit can cause the output to be interrupted while the new settings take effect. See Technical Specifications > EN\* VCM > Video > [Operating Times](#) for more information.

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## **Video Component Configuration**

The video configuration can be broken down in to the following sections:

### Video Input and Pre-Processing

Details the parameters that define the video input, and the processing of the video prior to it being encoded.

### Video Encoding

Details the parameters that define the video encoding.

### Video Stream Output

Details the parameters to be included in the video stream output.

### Vertical Blanking Interval Data Configuration

Details the parameters that define the VBI data extraction and processing.

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## **Video Pre-Processing**

The following parameters are available on the video pre-processor tab:

Parameter	Values	Description
Video Input Lock (Status Only)	Yes	The video input is locked to an input of the correct format.
	No	The video input is NOT locked to an input of the correct format.
	SDI	The video will be sourced from the SDI input on the rear panel.
	Color Bars	An internally generated color bars test pattern will be used as the video source.
Source	Black	An internally generated black test pattern will be used as the video source.
	Moving Object	An internally generated moving object test pattern will be used as the video source.
	Freeze Frame	Repeat the last good video frame on loss of video input.
Output On Video Loss	Black	Switch to a black test pattern on loss of video input.
	Color Bars	Switch to a color bars test pattern on loss of video input.
	Remove pid	Do not output the video component if the video input is not locked.
	SD 25 Hz	The video input is expected to be 25 Hz frame rate (625 line PAL)

Video Input Format	SD 29.97 Hz	The video input is expected to be 29.97 Hz frame rate (525 line NTSC)
Horizontal Video Bandwidth	30 to 100 %	Sets the video horizontal bandwidth filter.
MCTF		Enables or disables Motion Compensated Temporal Filtering. <i>(Requires the VP/SWO/SD/MCTF license)</i>
Stills Detection	On/Off	Detects if the video is a still picture, and if the unit is operating under Reflex control, it will request Bmin when a still is detected.
Film Mode	On/Off	Enables the detection of repeat fields in film material for more efficient video encoding

## Video Source

This controls whether the video to be compressed comes from the SDI input, or from one of the internal test pattern generators.

Selected Option	Description
SD SDI	The standard definition SDI input is used as the video source.
Black	An internally generated black test pattern at the defined frame rate is used as the video source.
Color Bars	An internally generated color bars pattern at the defined frame rate is used as the video source.
Moving Object	An internally generated moving pattern at the defined frame rate is used as the video source.

## Frame Rate

This defines the frame rate of the video to be decoded. If the video source is set to an internal test pattern generator, then this will define the frame rate of the video produced. However if the SDI input is selected as the video source, this defines the frame rate expected, and an alarm will be generated if the frame rate is not locked to a video input of this frame rate.

Selected Option	Description
25 Hz	The video source is expected to be at 25 Hz frame rate.(625 Lines) (PAL)
29.97 Hz	The video source is expected to be at 29.97 Hz frame rate.(525 Lines) (NTSC, PAL-M)

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## Video Encoding

Parameter	Values	Description
Video Profile	SD H.264 Main Profile Level 3.0 4:2:0 8 bit SD H.264 Main Profile Level 3.0 4:2:0 8 bit	Defines the encoding profile to be used
Resolution	The options are dependent on the select frame rate	Defines the horizontal and vertical resolution of the encoded video.
Video Bit rate	The valid bit rate range depends on the selected video profile.	Defines the transport stream bit rate to be used by the compressed video component. <i>(This is only used when Constant Bit Rate (CBR) operation has been selected.)</i>
Buffer Mode	CBR Seamless	Constant Bit Rate operation. This must be selected if Variable Bit Rate (VBR) i.e. Reflex operation is required.
Aspect Ratio	16:9 4:3	Does not effect the video encoding but rather indicates what the desired aspect ratio for the decoded picture (not the pixel). If no other mechanism such as WSS in the VBI is used, the video output image will use this aspect ratio.
GOP Length	4 to 250	Defines the nominal distance in steps of video frames between two consecutive I frames in the encoded bit-

GOP Structure	IP, IBP, IBBP, IBBBP	stream.
Scene Cut Detection	On, Off	Sets the number of B frames between reference frames Configuration to minimise affects caused by scene changes. An I-Frame will be inserted on scene changes, changing GOP length.
Seamless Buffer Delay	50 ms to 5 s	Defines the video buffer delay
Min Seamless Bit rate		Min bit rate for VBR operation
Lookahead Delay	360 ms to 1000 ms	The time between the lookahead encoder estimating the required bit rate and the final encoder encoding that piece of video.
Delay	Status Only	This reports the actual video encoding delay.

## Stream Output

Parameter	Values	Description
Embedded PCR	On Off	Controls whether a PCR (Program Clock Reference) should be included within the compressed video component stream.
Copyright	On Off	Controls the copyright flag within the elementary stream header.
Original	On Off	Controls the original flag within the elementary stream header.

## Reflex

Parameter	Values	Description
Enable Reflex	On, Off	This controls whether Reflex Statistical Multiplexing is enabled for the video output. THIS SHOULD NOT BE SET VIA THE WEB INTERFACE, but should only be controlled by nCC
Device Rx Counter	Status only	This shows the number of Reflex messages received by the unit. If Reflex is enabled this should be increasing.
Device Tx Counter	Status only	This shows the number of Reflex messages transmitted by the unit. If Reflex is enabled this should be increasing.
Socket Rx Counter	Status only	This shows the number of Reflex messages received by the VCM. If Reflex is enabled this should be increasing.
Socket Tx Counter	Status only	This shows the number of Reflex messages transmitted by the VCM. If Reflex is enabled this should be increasing.

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## Vertical Blanking Interval Data Configuration

### Aspect Ratio Signalling

Parameter	Values	Description
	Off	Video Index Extraction is disabled. This enable video index extraction from the default VBI

Video Index	On (Default) On (User)	lines. These are lines 11 and 324 in 25 Hz and 14 and 277 in 29.97 Hz Video Index extraction is enabled, but the user must specify the VBI lines from which it is to be extracted.
Video Index Field 1	Valid VBI Line (dependant on the selected video input format)	The field 1 VBI line to extract Video Index from when Video Index is On (User).
Video Index Field 2	Valid VBI Line (dependant on the selected video input format)	The field 1 VBI line to extract Video Index from when Video Index is On (User).
SMPTE 2016	On Off	Controls whether aspect ratio information is extracted from the input in accordance with SMPTE 2016
AFD Sustain	Maintain previously received AFD code for the period specified in Sustain Timeout then drop to default, i.e. code 1000  Maintain previously received AFD code indefinitely.  Maintain previously received AFD code for the specified in the Sustain Timeout field then switch AFD off.	
AFD Sustain Timeout	0, 1, 2, 3, 4, 5, 10, 20, 50, 100, 120	The number of frames that the AFD code will be sustained for.
AFD action on reserved codes	Pass through unchanged. Change code to 0000 Sequence Header Picture Header Sequence Header and Picture Header	Defines how reserved AFD codes are handled if they are received.
AR Signalling Location		Defines where the aspect ratio is inserted in the output stream.
AR Signalling Output Control	Off, AFD Only, AFD and Bar Data	Defines what aspect ratio information is inserted in the output stream.

### Time Code

Parameter	Values	Description
TC Mode	Off  External, zero on loss  External, free wheel on loss  Internal	No time code inserted in the output.  The time code extracted from the input video is inserted in the output, but if there is no time code extracted then 0 time is inserted.  The time code extracted from the input video is inserted in the output, but if there is no time code extracted then the inserted time code will free wheel.  An internally generated time code is inserted in to the output
TC Ext. Source	Auto, ANC VITC1, ANC VITC2, ANC LTC, VBI VITC	Selects from where in the input video the timecode is extracted. If Auto is selected then the card will attempt to extract time codes from all sources but will choose which to use with the following priority; ANC VITC1, ANC VITC2, ANC LTC, VBI VITC.
TC Drop Frames		

### Teletext (25 Hz Mode only)

Parameter	Values	Description
Teletext Source	Off, VBI Lines	Controls whether teletext is extracted from VBI or not.
Teletext Packetisation	Normal (ETS 300-472) Legacy (ETS 301-775)	Controls how the teletext data is packetised in to a component data stream.
Min # Teletext Packets	0 to 3	Defines the minimum number of teletext packets generated per field, even if there is no teletext data.
PTS On Teletext	Off, On	Controls whether a PTS value is included in the output teletext packets.

### VBI Lines

Each VBI line can be individually configured as to the format of VBI data that should be extracted from that line.

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## EN8180 HD MPEG-2 VCM (VP/HWO/EN8180/ENC)

The following topics describe the setting up of the VP/HWO/EN8130/ENC Video and Audio components.

### Video Component Configuration

### Audio Component Configuration

NOTE: Changes to the configuration of the unit can cause the output to be interrupted while the new settings take effect. See Technical Specifications > EN\* VCM > Video > [Operating Times](#) for more information.

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## Video Component Configuration

The video configuration can be broken down in to the following sections:

### Video Input and Pre-Processing

Details the parameters that define the video input, and the processing of the video prior to it being encoded.

### Video Encoding

Details the parameters that define the video encoding.

### Vertical Blanking Interval Data Configuration

Details the parameters that define the VBI data extraction and processing for SD inputs.

### VBI/VANC Data Configuration

Details the parameters that define the VBI data extraction and processing for SD inputs.

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## Video Pre-Processing

The following parameters are available on the video pre-processor tab:

Parameter	Values	Description
Video Input Lock (Status Only)	Yes No	The video input is locked to an input of the correct format. The video input is NOT locked to an input of the correct format.

Source	SDI	The video will be sourced from the SDI input on the rear panel.
	Color Bars	An internally generated color bars test pattern will be used as the video source.
	Black	An internally generated black test pattern will be used as the video source.
Output On Video Loss	Moving Object	An internally generated moving object test pattern will be used as the video source.
	Freeze Frame	Repeat the last good video frame on loss of video input.
	Black	Switch to a black test pattern on loss of video input.
Video Input Format	Color Bars	Switch to a color bars test pattern on loss of video input.
	Remove pid	Do not output the video component if the video input is not locked.
	SD 25 Hz	The video input is expected to be 25 Hz frame rate (625 line PAL) [SD Encoding Mode Selected]
	SD 29.97 Hz	The video input is expected to be 29.97 Hz frame rate (525 line NTSC) [SD Encoding Mode Selected]
	1080i25	The video input is expected to be 25 Hz 1080i [HD Encoding Mode Selected]
	720P50	The video input is expected to be 50 Hz 720P [HD Encoding Mode Selected]
	1080i29.97	The video input is expected to be 29.97 Hz 1080i [HD Encoding Mode Selected]
	720P59.94	The video input is expected to be 59.94 Hz 720P [HD Encoding Mode Selected]
	Horizontal Video Bandwidth	30 to 100 %
MCTF		Enables or disables Motion Compensated Temporal Filtering. <i>(Requires the VP/SWO/SD/MCTF license)</i>
Stills Detection	On/Off	Detects if the video is a still picture, and if the unit is operating under Reflex control, it will request Bmin when a still is detected.
Half Line Removal	On/Off	Enables the blanking of the VBI half line at the top of the picture. [SD Encoding Mode Selected]

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## Video Encoding

Parameter	Values	Description
Video Profile	SD MPEG-2 MP@ML 4:2:0 8 bit SD MPEG-2 MP@HL 4:2:0 8 bit	Defines the encoding profile to be used
Resolution	The options are dependent on the select frame rate and SD or HD video profile	Defines the horizontal and vertical resolution of the encoded video.
Video Bit rate	The valid bit rate range depends on the selected video profile.	Defines the transport stream bit rate to be used by the compressed video component. <i>(This is only used when Constant Bit Rate (CBR) operation has been selected.)</i> .
Buffer Mode	CBR Seamless	Constant Bit Rate operation.  This must be selected if Variable Bit Rate (VBR) i.e. Reflex operation is required.
Aspect Ratio	16:9 4:3	Does not effect the video encoding but rather indicates what the desired aspect ratio for the decoded picture (not the pixel). If no other mechanism such as WSS in the VBI is used, the video output image will use this aspect ratio.
GOP Length	4 to 250	Defines the nominal distance in steps of video frames between two consecutive I frames in the encoded bit-stream.

GOP Structure	IP, IBP, IBBP, IBBBP	Sets the number of B frames between reference frames
Scene Cut Detection	On, Off	Configuration to minimise affects caused by scene changes. An I-Frame will be inserted on scene changes, changing GOP length.
Seamless Buffer Delay	50 ms to 5 s	Defines the video buffer delay
Min Seamless Bit rate		Min bit rate for VBR operation
Lookahead Delay	360 ms to 1000 ms	The time between the lookahead encoder estimating the required bit rate and the final encoder encoding that piece of video.
Delay	Status Only	This reports the actual video encoding delay.

## Stream Output

Parameter	Values	Description
Embedded PCR	On Off	Controls whether a PCR (Program Clock Reference) should be included within the compressed video component stream.
Copyright	On Off	Controls the copyright flag within the elementary stream header.
Original	On Off	Controls the original flag within the elementary stream header.

## Reflex

Parameter	Values	Description
Enable Reflex	On, Off	This controls whether Reflex Statistical Multiplexing is enabled for the video output. THIS SHOULD NOT BE SET VIA THE WEB INTERFACE, but should only be controlled by nCC
Device Rx Counter	Status only	This shows the number of Reflex messages received by the unit. If Reflex is enabled this should be increasing.
Device Tx Counter	Status only	This shows the number of Reflex messages transmitted by the unit. If Reflex is enabled this should be increasing.
Socket Rx Counter	Status only	This shows the number of Reflex messages received by the VCM. If Reflex is enabled this should be increasing.
Socket Tx Counter	Status only	This shows the number of Reflex messages transmitted by the VCM. If Reflex is enabled this should be increasing.

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## HD Vertical Blanking Interval/Ancillary Data Configuration

### VBI/ANC

Closed Captions	The source for Closed Captions data (off or SMPTE 334) encoded as part of the Video Stream (only applicable when Video Frame Rate is 29.97 Hz)
-----------------	--

### Generic VANC Control

Generic ANC Extraction	Controls whether the ANC data (excluding audio) is extracted from the SDI input and carried in the VBI component in accordance with SMPTE 2038.
------------------------	---

Max ANC Bit Rate The maximum bit rate allocated for the ANC data can be set, up to a maximum of 2 MBit/s. If the incoming ANC data rate exceeds this an alarm will be raised.

#### Time Code Control

TC Mode Controls what mode the Time code (TC) is working in, either Off, external source or internally generated. Also sets what happens on loss of external source (zero or flywheel)

TC Source Controls the external source of Time Code auto will select the first source present in order of the drop down list.

#### Teletext (25 Hz Mode only)

Parameter	Values	Description
Teletext Source	Off, OP-47	Controls whether teletext is extracted from VANC (op-47) or not.
Teletext Packetisation	Normal (ETS 300-472) Legacy (ETS 301-775)	Controls how the teletext data is packetised into a component data stream.
Min # Teletext Packets	0 to 3	Defines the minimum number of teletext packets generated per field, even if there is no teletext data.
PTS On Teletext	Off, On	Controls whether a PTS value is included in the output teletext packets.

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## HD H.264 VCM (VP/HWO/EN8190/ENC)

The following topics describe the setting up of the VP/HWO/EN8190/ENC Video and Audio components.

### Video Component Configuration

### Audio Component Configuration

NOTE: Changes to the configuration of the unit can cause the output to be interrupted while the new settings take effect. See Technical Specifications > EN\* VCM > Video > [Operating Times](#) for more information.

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## Video Component Configuration

The video configuration can be broken down into the following sections:

### Video Input and Pre-Processing

Details the parameters that define the video input, and the processing of the video prior to it being H.264 encoded.

### Video Encoding

Details the parameters that define the H.264 video encoding.

### Video Stream Output

Details the parameters to be included in the video stream output.

## Vertical Blanking Interval/Ancillary Data Configuration

Details the parameters that define the VBI/ANC configuration.

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## Video Input and Pre-Processing

### Pre-Processor

Parameter	Description
Output On Video Loss	Controls the action taken when the video input is not locked to a video source of the defined frame rate.
Source	Sets the video source used by the video encoder.
Input Resolution	Sets the size to which the input video is scaled prior to being encoded.
Bandwidth	Sets the video horizontal bandwidth filter.
Noise Reduction	Sets the spatial and temporal noise filter on/off (requires license VP/SWO/HDMP4/NR.)

### Video Source

This controls whether the video to be compressed comes from the HD-SDI input, or from one of the internal test pattern generators.

Selected Option	Description
HD-SDI	The high definition SDI input is used as the video source.
Color Bars	An internally generated color bars pattern at the defined frame rate is used as the video source.
Black	An internally generated black test pattern at the defined frame rate is used as the video source.
Moving Object	An internally generated moving pattern at the defined frame rate is used as the video source.

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## Video Encoding

Video Encoder	
Resolution	Sets the size to which the input video is scaled prior to being encoded.
Video Bit rate	Value entered is the TS rate
Buffer Mode	Constant Bit rate or Seamless (for Reflex operation)
Aspect Ratio	Does not effect the video encoding but rather indicates what the desired aspect ratio for the decoded picture (not the pixel). If no other mechanism such as WSS in the VBI is used, the video output image will use this aspect ratio.
Target Quality	Defines the maximum quality of the encoding as a percentage between 30% and 100%. Reduced target effects a compromise between bit rate and quality.(Only used in reflex operation)
GOP Length	Defines the maximum distance in steps of video frames between two consecutive I frames in the encoded bit-stream.

GOP Structure	Sets the number of B frames between reference frames
Scene Cut Detection	Configuration to minimise affects caused by scene changes
Reflex	Reflex license required to enable configuration
Seamless Buffer Delay	Buffer Delay for Reflex operation
Min Seamless Bit rate	Min bit rate for reflex operation
Lookahead Delay	The time between the lookahead encoder estimating the required bit rate and the final encoder encoding that piece of video.
Profile	Defines the profile to be used for the encoding
AU Ctrl	Controls the data put into the TS for video Access Units (AU). This can be Random Access Indicator (RAI), AU info (ETSI 101 154) and Time Code (TC).

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## ASI Module: Operation and Control

The ASI Option module provides ASI outputs for the transmission of MPEG-2 transport streams.

There are no configurable parameters specifically on the ASI option module.

When an ASI option module is fitted in a base chassis the host detects its presence and adds the option to configure a transport stream to be output over ASI. This is available in addition to the standard IP outputs.

The ASI output transport stream is configured in the same way as for IP. From the web interface, browse to: **Configure > System > Slots > Slot n > ASI IO Option Card > Outputs > ASI Output 1 > Transport Streams**.

[Configure the Transport Stream](#) as required (ensure output is on, specify bit rate, add components, specify PIDs etc). This transport stream will be output on both ASI outputs. There is no option to configure the outputs separately.

It is not possible to automatically set a transport stream to be output over both IP and ASI. Each output stream must be individually configured.

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## External Sync Module: Operation and Control

The External Sync Input card enables the units internal 27 MHz System Clock Reference to be locked to an external clock source.

There are no configurable parameters on the external sync option module.

To configure the external sync input to be used as the clock source, from the web interface, browse to: **Configure > System > Base Unit**

The drop down list for MUX SCR source provides the available source clock options.

If the external sync option module is not fitted, only internal and video options will be available.

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## Current Configuration

The Host Controller maintains a copy of the current system configuration in flash memory. On system re-start, this current system configuration is restored, so the system returns to its previous state.

The parameters associated with each option card slot are stored, so that if an option card is removed, and then a card of the same type is plugged in to the slot, the system will attempt to apply the previous configuration for the card in that slot.

The current configuration of the unit can be extracted from the chassis in the form of an XML file.

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## Data Routing

### Packet Processing

Every received packet is examined and based on a routing table, determines where the packet should be routed, or whether the packet should be dropped.

The only received packets that need to be processed are:

- ARP
- ICMP
- Reflex PCR Exchange Messages (UDP)

The only possible destinations for received packets are:

- The Reflex PCR Exchange Message Handler
- The Host Processor

### Handling Processed Packets

Packets are routed or dropped based on the following fields:

- MAC destination address
- Source IP address and mask
- Destination IP address and mask
- EtherType (to allow filtering of ARP ICMP STP etc)
- UDP and TCP Destination UDP Port Number

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## nCompass Control

The unit has been designed to be primarily be configured and controlled using nCompass Control. Details of the basic configuration can be found in [Initial Configuration of the Video Processor with nCC](#).

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## Temperature Monitoring

### Overview

Temperatures are reported to the user in degrees Celcius ( $^{\circ}$  C) and degrees Fahrenheit ( $^{\circ}$  F).

### Host Card Monitoring

The die temperature of the main components on the Host card are monitored, and reported to an accuracy of  $\pm 2$   $^{\circ}$  C. A host card temperature alarm threshold can be set that, if exceeded, causes a 'System Over Temperature' Alarm to be generated.

### Option Card Monitoring

#### General

Option cards monitor the die temperature of their main components, and report these temperatures to an accuracy of  $\pm 2$   $^{\circ}$  C. If an option card reports die temperatures, it allows an alarm threshold to be defined for each temperature, which if exceeded causes an alarm to be generated.

#### VCMs

The controlling processor monitors the core temperatures of the main components and passes this information back to the host card via the back plane for monitoring.

Temperature thresholds can be set to cause a warning or an alarm. The warning level is configurable by the user, whereas the alarm level is hard coded.

#### Fans

The fans fitted to the chassis are speed controllable, and are a user configurable parameter **fan speed control**.

Parameter	Setting	Description
Fan speed control	Full speed	The fans run at the configured speed.
	Auto speed	Fan speed is related to the temperatures measured in the chassis.

See Basic Fault Scenarios > [Fans Not Working/Overheating](#) for further information.

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## SNTP

### Overview

The unit can obtain the [current time](#) from a network time server using SNTPv4 (RFC 4330) and is capable of working with Microsoft Windows Time, (SNTP as defined in RFC 1767).

### SNTP Time Server

If an SNTP Time Server is selected, and communications are established with it, then the unit uses the time obtained to correct the system's real time clock, and the user cannot set the clock.

If a time server has been configured, but it fails to respond, then an 'SNTP Server Failed To Respond' alarm is generated.

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## Simple Network Management Protocol [SNMP]

### Supported Protocols

SNMP versions 1, 2c and 3 are supported, primarily for alarm trap handling. The General EricssonTelevision MIB is also supported.

**NOTE:** The unit does not support control via SNMP, all remote control is via HTTP or HTTPS.

### Operation

The unit's SNMP functionality can be enabled or disabled, with up to five IP addresses assigned for any SNMP Trap message to be sent. The default is 000.000.000.000, which causes the SNMP traps to be sent to the last SNMP master. The SNMP community name can also be set.

The user can control which SNMP traps are generated. The options are;

- Start Messages only
- Fail and Start Messages only
- All Traps

### SNMP Interface Parameters

Parameter	Description
SNMP Read Community	The SNMP community name for read access. default = public
SNMP Location	Textual description of the location of the unit
SNMP Contact	Name of the person responsible for this unit
SNMP Trap Community	The SNMP community name for read access. default = private
SNMP Trap Destination	The destination IP address for SNMP trap messages. Up to five destinations can be defined, but by default none are assigned
SNMP Trap Alarm Level	Defines what events trigger the generation of an SNMP trap message. The options are:'Start Messages Only', i.e. only system start up events.'Fail and Start Messages only' i.e. start-up events and critical alarms.'All traps' i.e. start-up events and all alarms and warnings.

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## XPO

The unit supports an [HTTP/HTTPS](#) interface that is [XPO2](#) compliant for configuration and status monitoring. At least three simultaneous HTTP/HTTPS sessions can be supported. HTTP access can be enabled or disabled.

Individual parameters can be controlled via XPO2. It does not require the complete XML configuration to be sent to change a single parameter.

**NOTE :** The legacy XPO standard is not supported.

The web pages provide a service orientated control menu structure.

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## Looking After The Unit

This section details routine maintenance tasks to be performed by the operator and provides general servicing advice and fault-finding information. It also provides information regarding warranty and maintenance available from Customer Services and gives relevant disposal information.

### **Preventive Maintenance**

This section provides the schedules and instructions, where applicable, for routine inspection, cleaning and maintenance of the equipment which should be performed by an operator.

### **Troubleshooting**

This section provides some basic fault-finding procedures to follow in the event of a suspected failure.

### **Software and Firmware Upgrades**

Describes the mechanism for upgrading the system firmware and software.

### **Disposal**

Gives general information relating to the disposal of this equipment and specific information relating to Lithium batteries.

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## Preventive Maintenance

This section provides the schedules and instructions, where applicable, for routine inspection, cleaning and maintenance of the equipment which should be performed by an operator. There are also some basic fault-finding procedures to follow in the event of a suspected failure.

### **Routine Inspection and Cleaning**

Gives general information relating to Routine Inspection (specifically the Cooling Fans) and Cleaning.

### **Servicing**

Lists damage which might lead to a Service requirement. Discusses the restrictions relating to Replacement Parts. Gives a reminder concerning the checks that might be required on completion of servicing

### **Maintenance and Support Services**

Describes the levels of continuing product support services available from Ericsson.

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## Routine Inspection and Cleaning

### **Routine Inspection - Cooling Fans**

The fans on the unit can be temperature controlled so may not be on if the ambient temperature is low. Refer to [Technical Specification](#) for more information.

**NOTE :** Failure to ensure a free flow of air around the unit may cause overheating. This condition is detected by a temperature sensor on the Host Card or an Option card and causes the alarm to be raised.

## Cleaning

Unplug the unit from the wall outlet before cleaning the exterior with a damp cloth. Do not use liquid cleaners or aerosol cleaners.

**NOTE :** **Only the exterior of the case should be cleaned.**

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## Servicing

### Damage Requiring Service

#### **WARNING!**

Do not attempt to service this product as opening or removing covers may expose dangerous voltages or other hazards. Refer all servicing to service personnel who have been authorised by Ericsson.

Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:

1. When the power supply cord or plug is damaged
2. If liquid has been spilled, or objects have fallen into the product
3. If the product has been exposed to rain or water
4. If the product does not operate normally by following the operating instructions
5. If the product has been dropped or the case has been damaged
6. When the product exhibits a distinct change in performance

### Replacement Parts

When replacement parts are required, be sure the service technician has used parts specified by the manufacturer or which have the same characteristics as the original part. Unauthorised substitutions may result in fire, electric shock or other hazards.

### Checks on Completion of Servicing

Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in a safe operating condition. Also, performance and EMC checks may be required.

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## Maintenance and Support Services

### Introduction

Ericsson Television is a leader in the design, integration and implementation of digital broadcasting products and systems. It has a large team dedicated to keeping our customers on air 24 hours a day, 365 days a year.

With regional offices worldwide, and ultra-modern specialist service facilities in the US, UK, and Asia, Ericsson Television covers the world. There is a customer service centre open round the clock, every day of the year.

Years of design and support experience enable Ericsson Television to offer a range of service options that will meet your needs at a price that makes sense.

### Warranty

All Ericsson Television Products and Systems are designed and built to the highest standards and are covered under a comprehensive 12 month warranty.

## Levels of Continuing Ericsson Service Support

For stand-alone equipment, then Ericsson's BASIC Essential support is the value for money choice for you. BASIC provides you with year-by-year Service long after the warranty has expired.

For systems support you can choose either Gold Business Critical support or Silver Business Advantage. These packages are designed to save you costs and protect your income through enlisting the help of Ericsson Television support specialists.

Call Ericsson Television Sales for more details.

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## Troubleshooting

It is the objective of this chapter to provide sufficient information to enable the operator to rectify apparent faults or else to identify the suspect module, where possible.

### Troubleshooting Philosophy

States the objective of the Troubleshooting section and the level of information provided.

### Preliminary Checks

Provides first-line checks in the event of a problem.

### AC User Accessible Fuse Replacement

Gives the information required for fuse replacement.

### Managing Alarms

This topic describes how the unit handles alarms.

### Basic Fault Scenarios

Describes basic troubleshooting techniques for various common situations.

### Log Files

Describes the log associated with events such as power-on, alarm assertion and de-assertion etc.

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## Troubleshooting - Philosophy

It is the objective of this section is to provide sufficient information to enable the operator to rectify apparent faults or else to identify the suspect module, where possible. Some basic procedures are provided to follow in the event of a suspected Encoder failure. It is assumed that fault-finding has already been performed at a system level and that other equipment units have been eliminated as the possible cause of the failure (see the relevant System Manual).

---

### WARNING!

Do not remove the covers of this equipment. Hazardous voltages are present within this equipment and may be exposed if the covers are removed. Only Ericsson Television trained and approved service engineers are permitted to service this equipment.

---

### CAUTION!

Do not remove the covers of this equipment. Unauthorised maintenance or the use of non-approved replacements may affect the equipment specification and invalidate any warranties.

This handbook does not include any maintenance information or procedures which would require the removal of covers.

If the following information fails to clear the abnormal condition, call a Service Engineer or contact [Ericsson Customer Services](#).

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## Troubleshooting Preliminary Checks

Always investigate the failure symptoms fully, prior to taking remedial action. Fault diagnosis for the equipment operator is limited to the following tasks, since the operator should NOT remove the covers of the equipment:

1. Check the front panel alarm/status LED. If this is not lit:

a) Replace the fuse in the power connector at the rear panel (see [AC User Accessible Fuse Replacement](#)).

**NOTE :** Only replace the fuse once. If it blows again contact [Ericsson Customer Services](#).

b) Replace external equipment, power source and cables by substitution to check their performance.

2. Confirm that the equipment hardware configuration is suitable for the purpose and has been correctly installed and connected (see [Installing the Equipment](#)).

3. Confirm that inappropriate operator action is not causing the problem, and that the equipment software set-up is capable of performing the task being asked of it. If the validity of the configuration, set-up or operation is in doubt, check it (see [Operation and Control](#)).

4. Check that the fans are unobstructed and working correctly.

When the failure condition has been fully investigated, and the symptoms are known, proceed with fault-finding according to the observed symptoms. If the fault persists, and cannot be rectified using the instructions given in this handbook, contact [Ericsson Customer Services](#). Switch off the equipment if it becomes unusable, or to protect it from further damage.

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## AC User Accessible Fuse Replacement

The fuse(s) are held in integral fuse carriers in the AC power inlet(s) on the rear panel. In the case of dual power supply chassis, there are two fuses.

**NOTE :** Refer to Technical Specification > [Power Supplies](#) for information about the fuse.

---

### WARNING!

Before replacing the rear panel fuse, disconnect the unit from the supply. Failure to do so may expose hazardous voltages. Unplug the unit from the local supply socket.

---

To replace the AC power fuse:

1. Ensure that power is turned off and the power cable is disconnected from the AC power inlet.
2. Ease out the fuse carrier by placing a small, flat-bladed screwdriver in the notch at the top of the carrier.

---

**CAUTION!**

When replacing the power input fuse, always ensure that a fuse of the correct type and rating is fitted. Failure to do so results in inadequate protection.

---

3. Replace the fuse in the carrier.
4. Insert the fuse carrier back in the AC power inlet.



AC Power

*Position of AC Fuse Carrier*

If the replacement fuse also blows, do not continue. Disconnect the equipment and contact [Ericsson Television Limited Limited Customer Services](#) for advice.

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## Managing Alarms

### **Alarms**

Describes how an alarm can be assigned a level of severity and how it is treated in the unit.  
The Alarm Manager function is described, as is the use on an SNMP Trap.

#### **Alarms - Control Port**

This lists the alarms that could be raised by the control port during abnormal operational conditions.

#### **Alarms - Data Port**

This lists the alarms that could be raised by the data input during abnormal operational conditions.

#### **VCM Alarms**

Lists the alarms sent back to the host card from the VCMs. It also describes how the module self-monitors.

#### **Alarm Status Menu**

Describes the use of alarm status information.

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## Alarms

The chassis can report any error condition by generating an alarm event. Alarms are reported on the web page of the chassis, and can also be reported by the generation of SNMP traps.

Every alarm event type is assigned a severity level, the possible alarm severity levels are: masked, warning, minor, major, and critical.

If an alarm is masked, the alarm event causes no action.

The highest severity level of any active alarm is indicated by the Alarm LED on the front panel of the chassis. This is red if there are any active critical alarm, orange if the highest severity active alarm is major, or green if there are no active alarms, or active alarms or warnings are masked.

### Alarm Levels

The health of the system will be signalled by alarm events. An alarm event can be set to one of the following possible levels by the operator for each of the cards fitted to the chassis.

Alarm	Front Panel Status LED	Description
Masked	Green	Any change of state of the alarm is logged, but no further action is taken.
Warning	Amber	Any change of state of the alarm is logged. When active, the alarm is reported on the Alarm Status menu. An SNMP trap may optionally be generated for Warnings.
Minor	Amber	Any change of state of the alarm is logged. When active, the alarm is reported on the <a href="#">Alarm Status menu</a> . An SNMP trap may optionally be generated for Minor alarms.
Major	Amber	Any change of state of the alarm is logged. When active, the alarm is reported on the <a href="#">Alarm Status menu</a> . An SNMP trap is generated.
Critical	Red	Any change of state of the alarm is logged. When active, the alarm is reported on the <a href="#">Alarm Status menu</a> . An SNMP trap is generated. A control system will assume that the associated option card has failed, and will perform a card level redundancy switch.

### Alarm Treatment

Alarms are associated with either an option card or the Host. An option card informs the Host of the alarms that it can generate as part of its capabilities [xml](#) file. The Host reads this file when the option card is detected.

Alarms are treated as parameters, and are thus stored in the Parameter Store.

If the state of an alarm changes, the source of the alarm, i.e. the option card, or the Host System Manager generates a broadcast message to the systems internal Alarm IP Port to notify all interested applications of the new state of the alarm. It will also generate a syslog message so that the event is recorded in the system [log file](#).

### Alarm Manager

The Alarm Manager application listens on the Alarm Port, and maintains a history of all changes of alarm states, which it can provide to the web page manager if the alarm history is requested to be displayed.

The Alarm Manager also controls the overall alarm state of the chassis. This is used by both the TTv Health MIB, and the front panel driver. The overall alarm state can be either, no alarms, warning, or alarm.

### SNMP Trap

The SNMP Handler application also listens on the Alarm Port, and if SNMP Trap messages on alarms have been enabled, it will

generate the required trap messages for any change in alarm states.

The IP address to send SNMP trap messages to can be configured by the operator (see Operation and Control: [SNMP](#)).

The list of currently active alarms can also be accessed via the front panel.

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## Alarms - Control Port

The control ports can raise an alarm during abnormal operational conditions.

Alarm	Description
Ctrl x: Link Down	No link has been established on this Ethernet Control Port
Ctrl x: Duplicate Control IP Address Detected	Another device has responded to an ARP request for this Control port IP address

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## Alarms - Data Port

The data ports can raise an alarm during abnormal operational conditions.

Alarm	Description
Data x: Link Down	No link has been established on this Ethernet Data Port
Data x: Duplicate IP Address	Duplicate IP Address Detected; Another device has responded to an ARP request for the IP address of this port

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## VCM Alarms

### Alarm Handling

The VCM provides the following alarms back to the Host card.

- Loss of video (from any source)
- Loss of audio (from any source)
- Loss of VBI data
- Invalid Parameter (indicating which area video/audio/VBI/ANC data)
- Critical alarm (card has malfunctioned, internal log holds nature of failure)
- Over temperature (including a warning level as well as an critical level)

All masking of alarms is handled by the Host card.

### Self-monitoring

The VCM endeavours to self monitor itself for correct operation and correct any inconsistencies it finds. This includes the resetting of malfunctioning sub-systems or the whole card if necessary. The module attempts to maintain correct operation to minimise the effects of faults. All such actions are reported through the alarms/status/logging back to the host card.

## Module Responses

The Host card monitors all responses back from the module and resets the module if appropriate. This includes initiating redundancy switches if this results in limiting the error period. All actions are [logged](#) by the Host card.

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## Alarm Status Menu

### Current Alarms

The alarm status of the chassis is available on the web GUI: Alarms > Current. All currently active alarms will be displayed on this page, along with details of the time and date that the alarm was raised, the severity and description of the alarm and which module the alarm is associated with.

### Alarm History

A complete history of all alarms raised and cleared since the last power cycle is displayed on the web GUI: Alarms > History.

### Masking Alarms

The severity of the alarms that can be raised by each module can be edited if required on the we GUI: Alarms > Set Masks page. All possible alarms are listed, and the user can change the severity to be a warning, minor, major, critical or masked.

**NOTE :** If the alarm is masked it will not be displayed on any of the reporting interfaces, and will not produce an SNMP trap message.

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## Basic Fault Scenarios

### Unit Not Working

Gives high level information relating to an inactive unit.

### Fans Not Working/Overheating

What to do if the unit overheats.

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### Unit not Working

If the unit appears not to be working (e.g. Status LED unlit), fault-find the problem as detailed in the following table.

Step	Action	If Result of Action is Yes...	If Result of Action is No...
		If the unit is clearly working normally then	

1	Is the unit still working but the LED/LCD display inactive?	the LED/LCD Display itself is probably at fault. Call a Service Engineer.	Proceed to next step.
2	Check Power Source. Connect a known, working piece of equipment to the power source outlet. Does it work?	The problem lies within the unit or power cable. Proceed to next step.	The problem lies with the power source. Check building circuit breakers, fuse boxes, etc. If problem persists, contact the electricity supplier.
3	Check Power Cable and Fuse. Unplug the power connector from the unit and try it in another piece of equipment. Does it work?	The problem lies within the unit. Proceed to next step.	The problem lies with either the cable itself, or with the fuse in the plug. Replace the fuse or try to substitute another cable.
4	Check PSU Module and Fuse. Ensure the power connector is unplugged. Remove the fuse from the rear panel connector and inspect it. Has the fuse blown?	Replace the fuse with one of the correct type and rating (see Technical Specification > <a href="#">Power Supplies</a> ). If the PSU still does not work, unplug the power cable and call a Service Engineer.	Possible problem with the PSU module. Call a Service Engineer.

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## Fan(s) Not Working/Overheating

The fans can be disabled at low temperatures to allow the unit to quickly attain operational temperature. In the event of [overheating](#) problems, refer to the following table.

Step	Action	If Result of Action is Yes...	If Result of Action is No...
1	Check Fan Rotation. Inspect the fans located at the sides of the enclosure. Are the fans rotating? Check Base Board temperature and fan (see nCompass information).	Check that the unit has been installed with sufficient space allowed for air flow (see <a href="#">Installing the Equipment &gt; Mounting in a Rack &gt; Care in Positioning</a> ). If the ambient air is too hot, additional cooling may be required.	Possible break in the dc supply from the PSU module to the suspect fan(s). Call a Service Engineer.

**NOTE :** Failure to ensure a free air flow around the unit may cause overheating. This condition is detected by a temperature sensor on the Host Card which may be used to trigger an automatic alarm.

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## Log Files

### Overview

The unit stores a log of events such as power-on, alarm assertion and de-assertion etc. Every event in the log has a [UTC](#) time and date stamp attached to it to a resolution of 1 second.

### Log Operation

The event log is stored on the Host Controller Card (HCC). A log file is generated with a file format as defined by RFC3164. Once the log has filled the space allocated to it, the oldest entries in the log file are over-written.

Events that are logged include power-on, power on self test (POST) results, warning and alarm assertions and de-assertions, user log ins and log outs. Each event has a UTC time and date stamp appended to it, with a time resolution of one second.

The various system log files are accessible from the web pages. The system log can be exported as a comma separated list, so that it is easy to import it in to a spreadsheet, where it can be easily filtered or sorted.

## Time and Date

Any changes to the [time and date](#) are recorded in the system log.

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## Software and Firmware Upgrade

Generally an Upgrade Wizard will be provided to upgrade the unit software and firmware via the Ethernet control port.

In the event of a failed upgrade, it is possible to "re-boot" the system to such a level to allow software and firmware to be loaded onto it. In this case, contact Customer Support for assistance.

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## Equipment Disposal and Recycling

### General

Dispose of this equipment safely at the end of its life. Local codes and/or environmental restrictions may affect its disposal. Regulations, policies and/or environmental restrictions differ throughout the world. Contact your local jurisdiction or local authority for specific advice on disposal.

### Equipment Disposal



"This product is subject to the EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) and should not be disposed of as unsorted municipal waste."

### Lithium Batteries

The equipment uses the Dallas Semiconductor NVRAM DS1746WP which contains a Dallas DS9034PCX Power Cap Lithium battery. This cell is not a USA Environmental Protection Agency listed hazardous waste. It is fully encapsulated and should not be tampered with.

### Recycling

Ericsson SA TV Recycling has a process facility that enables customers to return Old and End-of-Life Products for recycling if it is required.

Ericsson provides assistance to customers and recyclers through our Ericsson and SATV Recycling eBusiness Portal. This can be reached at: <https://ebusiness.ericsson.net/>.

Click on the Login Page then enter:

User id: ETelevision

Password: Television

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## Technical Specification

### Base Chassis

Details the technical specification of the basic chassis.

### SD MPEG-2 VCM

Details the technical specification of the SD MPEG-2 VCM.

### SD H.264 VCM

Details the technical specification of the SD H.264 VCM.

### HD MPEG-2 VCM

Details the technical specification of the HD MPEG-2 VCM.

### HD H.264 VCM

Details the technical specification of the HD H.264 VCM.

### ASI I/O Module

Details the technical specification of the Ext Sync Module.

### External Sync Module

Details the technical specification of the Ext Sync Module.

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## Base Chassis

### Physical Details

Details the physical dimensions of the unit.

### Power Supplies

Lists the parameters relating to the unit's power supply.

### IP Output Transport Stream

Lists the controllable parameters for each IP Output transport stream for each output port or ports,

### Control Ethernet Specification

Gives information relating to the Control Port parameters and MAC Address. Also lists the IP parameters.

### Data Ethernet Specification

Gives information relating to the Data Port parameters and MAC Address. Also lists the IP parameters.

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## Physical Details

Item	Specification
Height	44.5 mm chassis
Width	442.5 mm excluding fixing brackets
Overall width	482.6 mm including fixing brackets
Depth	550 mm excluding rear connector clearance
Rack mounting standard	1U x 19 inch (1U = 44.45mm)
Approximate weight	7.5 kg (16.5 lbs)

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## Power Supplies

### A.C Mains Input

This equipment is fitted with a wide-ranging power supply. It is suitable for voltages of 100-240VAC -10% +6% at 50/60 Hz nominal.

### Specification

Item	Specification
Power distribution system	Type TN ONLY (EN 60950-1 Annex V): Power distribution system which is directly earthed, the parts of the equipment required to be earthed by Protective Earthing Conductors. This equipment must NOT be used with single-phase three-wire and PE, TT or IT Type Power distribution systems.
Connection to supply	Pluggable Equipment Type A (EN 60950-1 para 1.2.5): Equipment which is intended for connection to the building power supply wiring via a non-industrial plug and socket-outlet or a non-industrial appliance Coupler or both. Correct mains polarity must always be observed. Do not use reversible plugs with this equipment.
Class of equipment	Class I Equipment (EN 60950-1 para 1.2.4): electric shock protection by basic insulation and protective earth.
Rated voltage range	100-240 V AC (single phase)
Operating voltage range	90-254 V AC (single phase)
Voltage selection	Wide ranging
Rated frequency range	50-60 Hz
Operating frequency range	48-63 Hz
Rated current	4.0 – 2.0A
Input connector	CEE 22/IEC 3-pin male connector
Fuse	Fuse in live conductor in power input filter at rear of chassis. Do not use reversible plugs with this equipment. Bussmann S505
Fuse type	Littelfuse 215 5x20 mm time delay (T) 1500 A breaking capacity (HBC) IEC/EN 60127-2 Sheet 5
Fuse current rating	5 A 250 V T HBC
Power consumption	40 W – 350 W (Depending on Options fitted)

### Technical Earth

A [technical earth terminal](#) is located at the rear panel of the chassis.

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## IP Output Transport Stream

The following parameters are controllable for each IP Output transport stream for each output port or ports depending on the redundancy mode that is selected:

Parameter	Description/Range	Comment
Source IP Address	aaa.bbb.ccc.ddd	Source IP address
Subnet Mask	aaa.bbb.ccc.ddd	Source Subnet address
Source UDP Port	0 to 65535	Source IP Port Number
Destination IP Address	aaa.bbb.ccc.ddd	Destination IP address
Destination UDP Port	0 to 65535	Destination IP Port Number
Time To Live	0 to 240	TTL value for inclusion in the IP header
Type Of Service	0 to 255	ToS value for inclusion in the IP header

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## Control Ethernet Specification

### Overview

The system has two Ethernet control ports, that support IEEE 802.3 100BASE-TX and 1000BASE-T Ethernet protocols. The Control ports are accessible via RJ-45 connectors on the rear panel of the chassis and support IEEE 802.3u auto-negotiation and parallel detection. Also, the ports support Auto-MDIX.

Item	Specification
Connector type	RJ-45 (100/1000 Base T)
Connector designation	Ctrl 1/2
	Pin 1 - Rx/Tx A(+) Pin 2 - Rx/Tx A (-) Pin 3 - Rx/Tx B (+) Pin 4 - Rx/Tx C (+) Pin 5 - Rx/Tx C (-) Pin 6 - Rx/Tx B (-) Pin 7 - Rx/Tx D (+) Pin 8 - Rx/Tx D (-)
Pin outs (Unused pins are not connected)	

### IP Parameters

It is possible to configure the following IP parameters for the Control Port

Parameter	Description
IP Address	xxx.xxx.xxx.xxx (Ipv4)
Network Mask	xxx.xxx.xxx.xxx (Ipv4)
Gateway Address	xxx.xxx.xxx.xxx (Ipv4)

**NOTE :** The front panel always provides a way of changing these settings to prevent all control interfaces being disabled.

## MAC Address

The MAC address of each Ethernet Control port can be assigned via the Static Parameters table.

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## Data Ethernet Specification

### Overview

The Ethernet Data ports support IEEE 802.3u auto-negotiation and parallel detection. The auto-negotiation function can be disabled to force the line speed to be either 100 Mbps or 1000 Mbps.

These ports support Auto-MDIX. This function can be disabled.

Item	Specification
Connector type	RJ-45 (100/1000 Base T)
Connector designation	Ge 1/2    Ge 3/4
	Pin 1 - Rx/Tx A(+)
	Pin 2 - Rx/Tx A (-)
	Pin 3 - Rx/Tx B (+)
Pin outs	Pin 4 - Rx/Tx C (+)
(Unused pins are not connected)	Pin 5 - Rx/Tx C (-)
	Pin 6 - Rx/Tx B (-)
	Pin 7 - Rx/Tx D (+)
	Pin 8 - Rx/Tx D (-)

### Data Port Parameters

The transport streams output via the IP Outputs contains 188 byte long transport stream packets.

The time that a port has had a link established is recorded to an accuracy of  $\pm 1$  second, and the information made available to the user.

The Ethernet Data Ports always respond to ICMP Echo requests to any source IP address assigned to an output transport stream currently being transmitted on that port.

The Ethernet Data Ports respond to all ARP requests

There is hardware filtering of received packets (i.e. a hardware 'firewall') to protect the ports from malicious interference.

### IP Parameters

It is possible to configure the following IP parameters for the Data Port. See also Technical Specification: [IP Output Transport Stream](#)

Parameter	Description
IP Address	xxx.xxx.xxx.xxx (Ipv4)
Network Mask	xxx.xxx.xxx.xxx (Ipv4)
Gateway Address	xxx.xxx.xxx.xxx (Ipv4)

The default values for source IP address, subnet mask are those assigned to the ethernet port, or in the case of mirrored mode, those assigned to the primary IP port.

## MAC Address

The MAC address of each Ethernet Control port can be assigned via the Static Parameters table. It is not possible to set the MAC addresses of each of the Ethernet Data ports to the same value.

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## SD MPEG-2 VCM Technical Specification - EN8100 and EN7100

### SDI Input

Defines the parameters for the SDI IN connector.

### Digital Audio Input

Defines the Audio input and the associated parameters.

### Video

Defines the modes of video operation

### Audio

Defines the modes of audio operation

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## SDI Input



The following table defines the parameters for the SDI IN connector.

See also Technical Specification > SD MPEG-2 VCM:

- Audio > [Digital Audio Input](#)
- VBI/ANC > [Time Code, Ancillary Data Space \(ANC\)](#)

SDI IN Connector

Item	Description/Specification
Safety Status	SELV
Connector Designation	SD-SDI IN
Connector Type	75 Ω BNC female socket
Input Standard (UK/EC)	ITU-R RECMN BT.656-3 Interfaces for Digital Component Video Signals in 525-Line and 625-Line Television Systems Operating at the 4:2:2 Level of Recommendation ITU-R BT.601 (Part A).
Input Standard (USA)	ANSI / SMPTE 259M Television 10-Bit 4:2:2 Component and 4 fsc Composite Digital Signals -Serial Digital Interface (module only supports Component). Level C - 270 Mbps, 525/625 component.
Cable length	250m maximum from a source with an output level 800 mV pk-pk nominal ±10%
Recommended cable type	PSF 1/3

Input Level	800mV pk-pk nominal ±10%
Return Loss	Better than 15 dB, 10 MHz - 270 MHz
Input Impedance	75 Ω (powered-down impedance = 75 Ω)

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## Digital Audio Specification

### Audio Input

The [digital](#) input of the VCM accepts four stereo pairs of digital audio. The available encoding options depend upon the licenses enabled.

The HD/SD-SDI input of the VCM's can be used for audio input, where eight stereo pairs can be extracted from four groups of embedded audio. The DID associated with each group is set when the unit leaves the factory:

<b>DID associated with each group</b>		
	<b>HD-SDI</b>	<b>SD-SDI</b>
GROUP 1	0x2E7	0x2FF
GROUP 2	0x1E6	0x1FD
GROUP 3	0x1E5	0x1FB
GROUP 4	0x2E4	0x2F9

### Specification

The following is the specification for the Audio Digital Input.

<b>Item</b>	<b>Description/Specification</b>	
Safety Status	SELV	
Connector Designation	AUDIO/DATA	
Connector Type	15-way D-Type male connector	
	<b>AES3</b>	<b>AES-3id</b>
Interface	Balanced	Unbalanced
Connector	XLR-3	BNC
Impedance	110 Ω	75 Ω
Input Level	2 V -7 V peak to peak	1 V peak to peak
Max Input	7 V peak to peak	1.2 V peak to peak
Max current	64 mA	1.6 mA
Min Input	0.2 V	0.32 V
Cable	Shielded Twisted Pair	Coax

The following is the specification for the audio digital reference tone out:

<b>Item</b>	<b>Description/Specification</b>
	<b>AES/EBU digital</b>
Termination	75 Ω
Sampling rate	48 KHz

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## Video Formats

### Active Video Start Line

The active video starts on line 23 for both 525-line and 625-line (SMPTE RP 202-2000).

### Video Resizing

The unit supports the input of video at 720x576, 25 Hz and 720x480, 29.97 Hz.  
The following re-sampling of any input format is supported:

25 Hz input format	29.97 Hz input format	Process
720x576@25 (pass through)	720x480@29.97 (pass through)	Scale 1/1
704x576@25	704x480@29.97	Scale 1/1 and blank 8 pixels at left and right edges
640x576@25	640x480@29.97	Scale 8/9
544x576@25	544x480@29.97	Scale 3/4 and add 2 blank pixels to left and right edges
528x576@25	528x480@29.97	Scale 3/4 and blank 6 pixels at left and right edges in scaled image
480x576@25	480x480@29.97	Scale 2/3
352x576@25	352x480@29.97	Scale 1/2 and blank 4 pixels at left and right edges in scaled image
352x288@25 (SIF/CIF)	352x240@29.97 (SIF)	

#### NOTES :

1. For [SIF/CIF](#) resolutions (352x288 and 352x240) the vertical resolution drop is achieved by dropping the second field.
2. CIF and SIF are measures of video resolution. CIF resolution measures 352x288 pixels, regardless of whether the video input is NTSC or PAL. SIF resolution, on the other hand, measures 352x288 pixels for PAL cameras but 352x240 for NTSC cameras. CIF is commonly associated with H.261/H.263 and SIF with MPEG.

Should the output resolution be changed, the pre-processor ensures the change occurs at a GOP boundary and that the previous GOP is closed.

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## Audio Technical Specification

### Encoding Stereo

Lists the coding standards for any VCM audio module for coding stereo.

### MPEG-1 Layer II Coding Modes

This topic contains a full list of supported modes with associated descriptions.

### MPEG-1 Layer II Bit Rates

Tabulates the supported bit rates for the MPEG-1 layer II coding modes.

### Dolby Digital Encoding - Not Pass Through

Describes the support for the coding modes for Dolby Digital encoding (not pass through).

## **Pass Through Modes**

Describes the supported audio pass through options.

## **Audio Test Tone**

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## **Encoding Stereo**

The VCMs audio module codes up to eight channel pairs of the following listed coding standards.

Coding Standard	Maximum Number	Description	Comments
Dolby Digital	2	Dolby Digital Stereo Encoding	Only available when /SWO/DOLBY/AC3 has been purchased - 1 license required per channel pair.
MPEG Layer 2	8	MPEG -1 Layer II / Musicam Encode	Stream type MPEG-1 or MPEG-2 (user selectable), more than two channels are only available with additional /SWO/M1L2 licenses - 1 license required per channel pair.

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## **MPEG-1 Layer II Coding Modes**

### **Supported Modes**

The VCMs support the following coding modes for MPEG-1 Layer II:

Coding Mode	Implementation	Comments
Mono (left)	1/0 (L - input)	
Mono (right)	1/0 (R - input)	
Dual mono	1 + 1 (L/ch1, R/ch2)	Left and right are coded separately, referenced as two services/languages
Stereo	2/0	Coded as two mono signals, only referenced as one language/service in SI, output as stereo at the receiver
Joint Stereo	2/0 joint	Coded as a stereo pair, coding takes advantage of them being stereo, only referenced as one language/service in SI, output as stereo at the receiver

### **Mono [1/0 (L - input) or 1/0 (R - input)]**

This mode has a single audio channel that is encoded independently. It is seldom used in broadcast as most viewing devices now have stereo speakers or headphones.

### **Dual Mono [1 + 1 (L/ch1, R/ch2)]**

This was introduced to allow two mono channels to be carried in the same bandwidth as stereo signal. The main use for this mode is for multi-lingual transmission where the decoder selects which language to decode on left or right.

### **Joint Stereo [2/0 joint]**

This option is available for MPEG-1 Layer II only. This applies a technique called intensity coding. The human ear is not as good at locating higher frequencies as it is lower ones. The use of this mode may introduce more artefacts than stereo.

## Stereo [2/0]

This mode treats the incoming audio signal as a left and right channel that the viewer will listen to simultaneously. Practically, these stereo signals can be uncorrelated where they are coded separately or related where they are combined into a sum and difference channel and each is coded separately.

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## MPEG-1 Layer II Coding Bit Rates

The following table gives the coding modes and bit rates for MPEG-1 Layer II:

Bit rate (kbps)	Mono (Left or Right)	Dual Mono	Stereo	Joint Stereo
32	✓	X	X	X
48	✓	X	X	X
56	✓	X	X	X
64	✓	✓	✓	✓
80	✓	X	X	X
96	✓	✓	✓	✓
112	✓	✓	✓	✓
128	✓	✓	✓	✓
160	✓	✓	✓	✓
192	✓	✓	✓	✓
224	X	✓	✓	✓
256	X	✓	✓	✓
320	X	✓	✓	✓
384	X	✓	✓	✓

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## Dolby Digital Encoding

The VCMs support the following coding modes for Dolby Digital encoding:

- Mono 1/0 (centre, from left)
- Mono1/0 (centre, from right)
- Stereo 2/0 (left, right)

The following table gives the coding modes and bit rates for Dolby Digital encoding.

Bit rate (kbps)	Single Channel Mono (1/0) (Left or Right)	Dual Channel Stereo (2/0)
56	✓	X
64	✓	X
80	✓	X

96	✓	✓
112	✓	✓
128	✓	✓
160	✓	✓
192	✓	✓
224	✓	✓
256	✓	✓
320	✓	✓
384	✓	✓
448	✓	✓
512	✓	✓
576	✓	✓
640	✓	✓

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## Pass Through Modes

### Clocking

For the best performance when passing through compressed audio the video and audio coming into the unit must be locked together, and the system clock locked to 'Video' or 'Ext SYNC'. When set to 'Ext SYNC' the audio and video must also be locked to this source.

### Dolby Digital

The audio module can pass through pre-encoded Dolby Digital audio (up to 5.1).

### Linear PCM

For passing through 2 channels (1 channel pair) of uncompressed data the audio module complies with SMPTE 302M standard. The module supports 24, 20 and 16 bit word sizes on the input and output. The bit-depth option defines the output word size and is independent of the input. Only 2 channels are supported per PID.

### Dolby E

The audio module can pass through pre-encoded Dolby E audio. The input word size is automatically detected, and this is applied to the output. Only 1 Dolby E stream is supported per PID. Complies with SMPTE 302M, SMPTE 337M and SMPTE 338M.

SMPTE 302M: Mapping of AES3 Data into MPEG-2 Transport Stream.

SMPTE 337M: Format for Non-PCM Audio and Data in AES3 Serial Digital Audio Interface.

SMPTE 338M: Format for Non-PCM Audio and Data in AES3 - Data Types.

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## Audio Test Tone

The module is able to generate a test tone on any audio channel at 1 kHz, with a level of -6dB.

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## SD H.264 VCM Technical Specification - EN8130

### SDI Input

Defines the parameters for the SDI IN connector.

### Digital Audio Input

Defines the Audio input and the associated parameters.

### Audio

Defines the modes of audio operation

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## HD MPEG-2 VCM Technical Specification

### HD-SDI Input

Defines the parameters for the HD-SDI IN connector.

### Digital Audio Input

Defines the Audio input and the associated parameters.

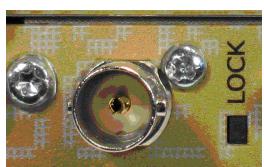
### Audio

Defines the modes of audio operation

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## HD-SDI Input



HD-SDI IN Connector

The following table defines the parameters for the HD-SDI IN connector.

See also Technical Specification > HD H.264 VCM:

- Audio > [Digital Audio Input](#)
- VBI/ANC > [Time Code, Ancillary Data Space \(ANC\)](#)

Item	Description/Specification
Safety Status	SELV
Connector Designation	HD-SDI IN

Connector Type	75 Ω BNC female socket
Input Standard	ANSI / SMPTE 292M
Cable length	150m maximum from a source with an output level 800 mV pk-pk nominal ±10%
Input Level	800mV pk-pk nominal ±10%
Return Loss	Better than 15 dB, 5 MHz - 1.5 GHz
Input Impedance	75 Ω (powered-down impedance = 75 Ω)

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## HD H.264 VCM Technical Specification

### HD-SDI Input

Defines the parameters for the HD-SDI IN connector.

### Digital Audio Input

Defines the Audio input and the associated parameters.

### Audio

Defines the modes of audio operation

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## ASI Option Module

### Technical Specification

The ASI Option card provides a means of outputting an MPEG-2 transport stream over an ASI connection.

Two outputs are provided which are configured as "mirrored", such that the same TS is output from each connection.

Two input BNC connectors and associated "lock" LED's are available, but are not supported in this release.

Item	Specification
Standard	CENELEC EN50083-9 2002
Safety Status	SELV
Connector Designation	ASI OUT 1/ ASI OUT 2
Connector Type	75Ω BNC
Input Impedance: (Resistive termination)	75Ω

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## External Sync Module

### Technical Specification

The External Sync Option card provides a means of inputting a system reference either from an external, 10MHz clock or analog video source. Only one reference source may be connected at any time, and the single BNC connector caters for either input signal type.

Item	Specification
Safety Status	SELV
Connector Designation	SYNC IN
Connector Type	75Ω BNC
Input Impedance: (Resistive termination)	75Ω

### Input (Analog Video)

The input is capable of accepting a wide range of analogue video input voltage levels and is also capable of accepting various colour standards. Requirements for the video input signal are defined in the following table.

Nominal Video level: (AC Coupled)	0.5 to 2.0 Volts peak to peak
Applicable Video Standards:	PAL, NTSC
Input Video Interfaces:	Composite(CVBS), S-Video(Y/C), and Component Video(YPBPR/GBR)
Chroma Filter	Always present

### Input (10MHz Reference)

A 10 MHz input can be applied via the BNC connector which may be sinusoidal or square in shape. The required characteristics for the input signal are defined in the following table.

Input Level: (AC Coupled)	1 Volt peak to peak
Input waveform:	Sinusoidal or Square

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## Appendices

### A Brief Introduction to Audio Coding Standards

Gives an overview of some of the different audio coding standards available.

### IP Encapsulation of Transport Streams

Describes the layers involved and the associated overheads.

### Option Cards

Lists the available option cards and gives information related to the handling of the cards.

### Compliance Statements

States the standards with which the unit complies.

## **Clock and Timing**

This section describes the use of derived and real time clocks throughout the unit.

## **Redundancy Modes**

This section gives information relating to the various redundancy functions available.

## **Alarm Lists**

Provides information about the alarms that can be generated by the unit.

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# **A Brief Introduction to Audio Coding Standards**

Where appropriate, the output transport stream can be made compliant with ATSC A53(E) ATSC Digital Television Standard and DVB 101-154 v1.7.7.

## **MPEG**

The Moving Pictures Experts Group (MPEG) was formed in 1988 to generate compression techniques for audio and video. In the first version, ISO/IEC 11172-3 MPEG-1 audio, has a selection of two separate algorithms. MPEG-1 Layer I and II were implementations of the MUSICAM algorithm and MPEG-1 Layer III (mp3) was an implementation of the ASPEC algorithm. The algorithms have since been improved and extended with other versions of MPEG.

### **MPEG-1 Layer I/II**

This algorithm is similar to MUSICAM and only really differs in the structure of the frame headers. Layer I is a restricted version of the full algorithm to allow a reduced decoder to be developed. Hence, over time as the processing power of decoders have increased by orders of magnitude, Layer I is no longer used for broadcast.

The algorithm creates 3 frames of 384 samples. Each small frame is divided into subbands and these subbands can be coded for each frame or for all 3. There is limited ability to allocate bits to different bands and there is no entropy coding of the encoded samples so a relatively high bit rate is required to obtain a reasonable quality.

### **Dolby Digital**

Dolby Digital is an algorithm from Dolby that forms part of both the ATSC and DVB standard for digital broadcasting. It is marketed under the name of Dolby Digital.

The encoder includes a psychoacoustic model to improve the quality. The signal is divided into 32 multiple subbands, which correspond to the critical bands of the human ear. The number of bits is fixed for each subband but there are additional bits that can be allocated to any subband where encoding quality has suffered. Dolby recommends stereo signals may be coded at 192 kbit/s, and 5.1 at 448 kbit/s, but other rates can be used if required.

The encoders have the ability to encode stereo and equivalent modes, and will also pass through pre-compressed Dolby Digital (both stereo and multi-channel).

When in Dolby Digital Pass-through mode, glitch suppression is supported, where the coding module monitors the encoded bitstream and if the framing structure is incorrect, a valid silence frame or the last good frame is inserted in its place. If this state occurs for more than a second, the encoder signals that the Dolby Digital bitstream is corrupted.

### **Dolby Digital Plus**

Dolby Digital Plus offers enhanced performance over Dolby Digital. Some of the algorithm improvements are:

Transient pre-noise processing - to reduce "pre-noise" artifacts before sharp transients.

Enhanced channel coupling – which maintains phase relationships between channels, and improves performance of matrix decoders.

Adaptive hybrid transform processing – an improved bit allocation and quantization algorithm

### **SMPTE 302M: Mapping of AES3 Data into an MPEG-2 Transport Stream**

Though not specifically a coding standard, this does define a method of carrying AES3 uncompressed audio streams in an MPEG-2

transport stream. The AES stream can contain non-audio data as well as uncompressed audio. This mechanism can be used to carry Linear PCM audio, or Dolby E data.

## Dolby E

Dolby E was developed by Dolby Laboratories. It allows up to 8 channels of Dolby E compressed audio to be distributed over an existing 2 channel digital infrastructure. The compression applied is less than that for consumer codecs (i.e. Dolby Digital), so is better quality and the audio can be decompressed and re-compressed several times. The Dolby E stream can also include metadata and timecode.

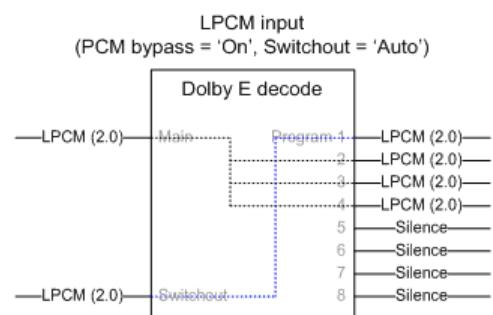
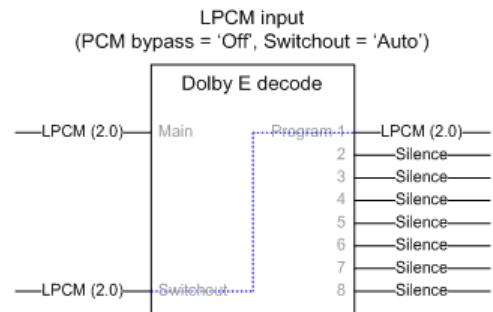
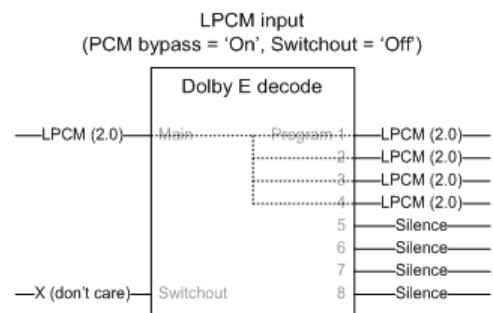
Dolby E frame duration is either equal to or double the duration of a video frame. For interlaced formats the duration matches a video frame, but is double the frame duration for progressive formats. This facilitates easier editing of video and audio in the digital domain. Dolby E frames are generally aligned to video frames.

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## Dolby E PCM Bypass and Switchout

Audio routing for PCM bypass and switchout when Dolby E is not present on the main input is shown in the diagrams below.



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## Option Cards

### Available Option Cards

Tabulates the option cards available at this release.

### Handling Option Cards

This section gives information relating to the handling of Option Modules as they are inserted/removed from the unit.

### Option Card Hot Swap

This section gives an overview of the way the host checks the availability of an option module.

### Option Card Plug and Play

This section gives an overview of the plug and play concept used in the unit.

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## Available Option Cards

The following lists the option cards that are supported at this release.

Marketing Code	Name	Description
VP/HWO/EN8190/ENC	<a href="#">EN8190 H.264 HD Module</a>	This provides premium quality H.264 compression of HD video, and audio compression
VP/UPG/HWO/EN8190/ENC	<a href="#">EN8190 H.264 HD Module</a>	Field Upgradable Option to provide premium quality H.264 compression of HD video, and audio compression
VP/HWO/EN8100/ENC	<a href="#">EN8100 MPEG-2 SD Module</a>	This provides premium quality MPEG-2 compression of SD video, and audio compression
VP/UPG/HWO/EN8100/ENC	<a href="#">EN8100 MPEG-2 SD Module</a>	Field Upgradable Option to provide premium quality MPEG-2 compression of SD video, and audio compression
VP/HWO/EN7100/ENC	<a href="#">EN7100 MPEG-2 SD Module</a>	This provides high quality MPEG-2 compression of SD video, and audio compression
VP/UPG/HWO/EN7100/ENC	<a href="#">EN7100 MPEG-2 SD Module</a>	Field Upgradable Option to provide high quality MPEG-2 compression of SD video, and audio compression
VP/HWO/EXTSYNC	<a href="#">External Sync Module</a>	This provides a synchronization input at the rear of the chassis that will accept either a video signal, or a 10 MHz reference input.
VP/UPG/HWO/EXTSYNC	<a href="#">External Sync Module</a>	Field Upgradable Option to provide a synchronization input at the rear of the chassis that will accept either a video signal, or a 10 MHz reference input.

Option modules form the core of the unit and are required to provide the desired functionality.

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## Handling Option Cards

This section gives information relating to the handling of Option Modules as they are inserted/removed from the unit.

### Handling Option Cards

Gives guidance relating to the care and handling of Option Cards.

### **Adding an Option Card**

Gives information relating to adding an Option Module and how to check the operation was successful.

### **Removing an Option Card**

This page details what to do when it is desired to remove (and not replace) an option card.

### **Replacing an Option Card**

Gives information relating to the replacing of an Option Module and how to check the operation was successful.

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## **Handling Option Cards**

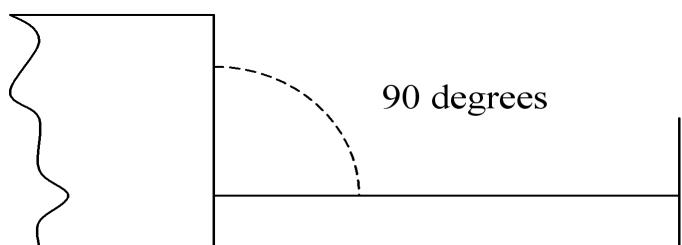
### **Physical Handling**

#### **WARNING..**

CARE MUST BE TAKEN IN INSERTING OR WITHDRAWING ANY OPTION CARD.

UNDERSIDE COMPONENTS MAY BE PHYSICALLY DAMAGED BY CARELESS HANDLING.

Cards must be inserted and withdrawn slowly whilst ensuring that the card is kept orthogonal (at 90 degrees to the rear of the unit):



OPTION CARDS SHOULD NOT BE PLUGGED IN WITH EXCESSIVE FORCE.

IF ANY SIGNIFICANT RESISTANCE TO INSERTING A CARD IS FELT, THE OPERATOR SHOULD WITHDRAW THE CARD SLIGHTLY AND CHECK FOR ANY OBSTRUCTIONS.

## **Electrostatic Discharge**

#### **WARNING!**

Static electricity can damage electronic components. To avoid damage, keep option cards in their static-protective package until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Where possible ensure that antistatic protection is worn by the user (for example an earthed antistatic wrist strap, an ankle or heel strap).
- Handle the Option Card carefully, holding it by its edges or its rear panel.

- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the Option Card where others can handle and possibly damage it.
- While the Option Card is still in its anti-static package, touch it to an unpainted metal part of the system unit for at least two seconds. (This drains static electricity from the package and from your body.)
- Remove the Option Card from its package and install it directly into your base chassis without setting it down. If it is necessary to set the Option Card down, place it in its static-protective package.
- Take additional care when handling components during cold weather, because heating reduces indoor humidity and increases static electricity.

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## Adding an Option Card

### Overview

- A new card can be inserted when the chassis is off or on.
- Once inserted and powered the chassis will determine the option card capabilities and make it available for configuration.
  - Initially a default set of parameters will be in place.
- As long as there are licenses available for the features required, the option card can then be configured and used immediately.

---

### WARNING!

Refer to "[HANDLING OPTION CARDS](#)" to miniise risk of damage to option cards or base chasis.

---

### Procedure

An option card can be added to a unit with the base chassis either powered or un-powered. The procedure is as follows:

1. Remove the blanking plate from the option card slot in which the new card is to be fitted.
2. Carefully remove the new option card from its anti-static package, and insert it in to the base chassis, slotting the card edges in to the card guides.
3. Push the card home, so that the rear panel is flush with the rear of the base chassis.
4. Tighten the two captive retaining screws.
5. Connect any external cables to the new option card.
6. When the chassis detects a new card fitted, it will be displayed on the option slots web page, and an alarm will be raised. If all options are reported correctly, the "accept option slot configuration" needs to be applied. This will accept the new hardware configuration and clear the alarm.

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## Removing an Option Card

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### WARNING!

Refer to "[HANDLING OPTION CARDS](#)" to miniise risk of damage to option cards or base chasis.

---

An option card can be removed, and does not need to be replaced.

1. Disconnect any cables from the option card to be replaced.
2. Loosen the two captive screws that retain the option card in the base chassis.
3. Holding the captive screws, pull the option card from the unit and place it in suitable anti-static packaging, (observe the handling precautions).
4. Fit a blanking panel in place of the removed option card.
5. When the unit detects a card is no longer present, it will be displayed on the option slots web page, and an alarm will be

raised. If all options are reported correctly, the "accept option slot configuration" needs to be applied. This will accept the new hardware configuration and clear the alarm.

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## Replacing an Option Card

A failed option card can be replaced without powering down the base chassis, i.e. can be 'hot-swapped'.

1. To perform a hot-swap the option cards should only be unplugged or inserted when the chassis is fully booted and configured.
2. Only ONE option card should be plugged in at a time, to prevent problems due to inrush current, and to ensure that the host recognises and configures the new card.
3. If more than one option card is being fitted, a wait time of approximately 10s should be allowed between inserting each option card.

---

### WARNING!

Refer to "[HANDLING OPTION CARDS](#)" to minimise risk of damage to option cards or base chassis.

---

The process to replace an option card is as follows:

1. Disconnect any cables from the option card to be replaced.
2. Loosen the two captive screws that retain the option card in the base chassis.
3. Holding the captive screws, pull the option card from the unit, (observe the handling precautions).
4. Carefully remove the replacement option card from its anti-static package, and insert it in to the base chassis, slotting the card edges in to the card guides.
5. Push the card home, so that the rear panel is flush with the rear of the base chassis.
6. Tighten the two captive retaining screws.
7. Connect any external cables to the replacement option card.

**NOTE :** If the replacement card is of the same type as the failed card, then it will be automatically configured to the same settings as the failed card.  
If the replacement card is of a different type then an alarm will be generated.

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## Option Card Hot Swap

The unit regularly monitors to verify option card presence and to detect if a card has been removed or added. When a new card is inserted it will start-up and attempt to link to the host controller. When this link has been established the process of identifying the card and its capabilities begins. Once this is established, the card will be configured with the same configuration as the card that has been replaced (assuming that the replacement card has the same capabilities).

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## Option Card Plug and Play

The unit is designed around a 'Plug and Play' concept to make it as easy as possible to add new option cards and functionality. This means that the chassis and Host controller card provide a base level of functionality, while any specific functionality associated with

an option card is contained on the option card itself.

A good example of this is MPEG SI generation. The Host controller provides the functionality to generate and play out the SI required by a transport stream. However a VCM is required to provide any descriptors required for any elementary stream types that it generates.

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## Compliance Statements

The following Compliance statements are given in this section:

- [CE Marking](#)
- [C-Tick Marking](#)
- [Electromagnetic Compatibility](#)
- [Environmental](#)
- [Equipment Disposal and Recycling](#)
- [Materials Declaration](#)
- [Packaging](#)
- [Safety Compliance](#)

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## CE Marking



The CE mark is affixed to indicate compliance with the following directives:

DIRECTIVE 2006/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 December 2004 on the approximation of the laws of the Members States relating to electromagnetic compatibility.

1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity. (If fitted with telecom type interface modules).

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## C-Tick Mark

The C-Tick mark is affixed to denote compliance with the Australian Radiocommunications (Compliance and Labelling – Incidental Emissions) Notice made under s.182 of Radiocommunications Act 1992.

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## Electromagnetic Compatibility (EMC)

The equipment has been designed and tested to meet the following:

EN 55022 and CISPR22	European International	Emission Standard Limits and methods of measurement of radio frequency interference characteristics of information technology equipment - Class A.
EN 61000-3-2	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)
EN 61000-3-3	European	Electromagnetic Compatibility (EMC), Part 3. Limits; Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current up to and including 16 A.
EN 55024	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement.
FCC	USA	Conducted and radiated emission limits for a Class A digital device, pursuant to the Code of Federal Regulations (CFR) Title 47 Telecommunications, Part 15: Radio frequency devices, subpart B - Unintentional Radiators.

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## Environmental

### General

The Encoder is for use in non-hostile environments, (i.e. designed for indoor use only with no protection against dust or water ingress).

Item	Specification
<b>Operational</b>	
Temperature	-10°C to +50°C (14°F to 122°F) ambient with free air-flow. It may require a 10 minute warm-up period before all clocks are within specification if the ambient temperature is less than 0°C.
Relative humidity	0% to 95% (non-condensing)
Cooling requirements	Cool air input from left side of unit, exhaust from right side of unit. See <a href="#">Care in Positioning</a>
Handling/movement	Designed for stationary or fixed use when in operation
<b>Transportation (Packaged)</b>	
Temperature	-40°C to +70°C (-40°F to 158°F)
Relative humidity	0% to 95% (non-condensing)
<b>Storage</b>	
Temperature	-25°C to +70°C (-13°F to 158°F)
Relative humidity	0% to 95% (non-condensing)

### Handling and Packaging

The product requires no special handling or packaging other than normal procedures for EricssonTelevision equipment and is suitable for lifting by one person.

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## Materials Declarations

EricssonTelevision products are designed and manufactured in keeping with good environmental practise. Our component and materials selection policy prohibits the use of a range of potentially hazardous materials. In addition, we comply with relevant environmental legislation.

### For the European Union

For product sold into the EU after 1st July 2006, we comply with the EU RoHS Directive. We also comply with the WEEE Directive.

### For China

For product sold into China after 1st March 2007, we comply with the "Administrative Measure on the Control of Pollution by Electronic Information Products". In the first stage of this legislation, content of six hazardous materials has to be declared together with a statement of the "Environmentally Friendly Use Period (EFUP)": the time the product can be used in normal service life without leaking the hazardous materials. EricssonTelevision expects the normal use environment to be in an equipment room at controlled temperatures (around 22°C) with moderate humidity (around 60%) and clean air, near sea level, not subject to vibration or shock.

Where EricssonTelevision product contains potentially hazardous materials, this is indicated on the product by the appropriate symbol containing the EFUP. For EricssonTelevision products, the hazardous material content is limited to lead (Pb) in some solders. This is extremely stable in normal use and the EFUP is taken as 50 years, by comparison with the EFUP given for Digital Exchange/Switching Platform in equipment in Appendix A of "General Rule of Environment-Friendly Use Period of Electronic Information Products". This is indicated by the product marking:



It is assumed that while the product is in normal use, any batteries associated with real-time clocks or battery-backed RAM will be replaced at the regular intervals.

The EFUP relates only to the environmental impact of the product in normal use, it does not imply that the product will continue to be supported for 50 years.

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## Packaging

### Packaging Statement

The outer carton and any cardboard inserts are made from 82% recycled material and are fully recyclable.

The Stratocell or Ethafoam 220 polyethylene foam inserts can be easily recycled with other low density polyethylene (LDPE) materials.

### Packaging Markings

The symbols printed on the outer carton are described below:



Handle with care



This way up



Fragile



Protect from moisture

See [CE Marking](#)

See [C-Tick Mark](#)

Defines country of origin



The packaging is reusable per GB 18455-2001



This symbol guarantees that packaging with this symbol is recyclable and will be accepted by cardboard recyclers



Recyclable per GB 18455-2001

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## Safety Compliance

### General

This equipment has been designed and tested to meet the requirements of the following:

- EN 60950-1 European Information technology equipment - Safety.
- IEC 60950-1 International Information technology equipment - Safety.
- UL 60950-1 USA Information Technology Equipment - Safety.

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## Clock and Timing

### Program Clock Reference (PCR)

Describes the requirements for Program Clock Reference (PCR) and its configuration options in the unit.

### Single PCR Operation

Describes how to configure the unit for Single PCR operation when required.

### Real Time Clocks

Describes the units real time clock and the associated user configurable parameters. Also, information relating to the SNTP Server is given.

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## Program Clock Reference

The MPEG Standard defines a Program Clock Reference (PCR) to be included in a transport stream to allow a decoder to lock to the 27 MHz clock being used by the encoder.

The DVB standards require a PCR to be present in a transport stream every 40 ms or less, (but it is possible to configure the unit to generate PCRs less frequently).

The PCR can be embedded in a component PID, (i.e. video or audio), or it can be carried on its own PID.

When multiple services are carried in a single transports stream, each service may have its own PCR, or they may all reference the same PCR, ([single PCR Operation](#)).

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## Single PCR Operation

If it is desired to use a single PCR for multiple services then the video and audio encoders must all be locked to the same 27 MHz clock. This can be achieved in a number of ways:

The Mux SCR Source can be set to internal. Then all option cards in the unit will receive and use the internally generated 27 MHz clock and the related PCR value. However this does not ensure that the output of other units are synchronised.

If an External Sync card is fitted, the Mux SCR Source can be set to 'Ext Sync'. The unit's internal 27 MHz reference is then locked to the external sync reference input. So if all units are fed with the same sync reference signal they will all be locked to the same 27 MHz clock. The units will however all have different PCR values, but as they are all locked to the same 27 MHz clock they will all have a fixed delta between them. The downstream multiplexer can calculate the deltas between the streams and re-stamp the PCRs, PTSs and DTSS in the output stream to all have a common reference.

Another way of configuring a single PCR system is to lock all the video and audio sources to the common reference 27 MHz clock before they are sent to the encoders. Then the units can all have MUX SCR Source set to video, i.e. each encoder will lock to the 27 MHz of its video input. Therefore all the outputs will be locked to the same 27 MHz, but without the need for an Ext Sync card. The rest of the system operates in the same way with the Multiplexer re-stamping the time references to a common reference.

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## Real Time Clock

### Overview

The Host Controller card has a real time clock, which is battery powered when the chassis is unpowered, so that the time and date is maintained. This clock is designed to be accurate to  $\pm 1$  minute per month. The battery is capable of powering the clock for over two years.

### User Configurable Parameters

The user configurable parameters associated with the clock are defined below

Parameter	Values	Description
Local Time	hh:mm:ss	Current local time in hours minutes and seconds
Local Date	dd:mm:yyyy	Current date in day month and year

### SNTP Server

An SNTP server can be configured to update the clock and calendar or else the user can update the time and date. Any changes to

the time and date are recorded in the system log.

The real time clock is used to set the time and date when the unit is started, but then its own time and date is maintained, unless a change to the time and date parameters occur, when it will be updated to the new settings.

The system can set or correct its system clock from information received from an SNTP Time Server. More specifically it supports SNTP V4 and also Microsoft Windows Time (W32Time), which means that it supports NTP V3.

The user can enter the IP address of the SNTP server to be used, the default address is 000.000.000.000, which indicates to the system that no SNTP server has been defined, and therefore SNTP is disabled.

If an SNTP server is defined, and it fails to respond, then an SNTP Server Timeout alarm will be raised. This alarm will be de-asserted either when an SNTP response is received, or the SNTP functionality is disabled.

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## Redundancy Modes

### Redundancy Overview

Gives a general overview of redundancy operation.

### Control Network Redundancy

Gives an overview and describes the operation of the Control ports. Information is given relating to the Automatic Redundancy Mode.

### Data Network Redundancy

Describes the data redundancy modes in some detail.

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## Redundancy Overview

### **Redundancy Switching**

The Video Processor can provide chassis level and card level redundancy. This feature is provided with the use of an external controller, e.g. nCompass Control (nCC).

A failure that requires a redundancy switch will be signalled by means of a critical alarm. There are two different critical alarm levels, [card critical alarm](#) and [chassis critical alarm](#).

The user can define an alarm that can be isolated to a single option card as a card critical alarm, if they want the assertion of this alarm to cause a card redundancy switch. It is not possible to define an alarm that cannot be isolated to a single option card as a card critical alarm. If the assertion of such an alarm is required to trigger a redundancy switch the user must set it as a Chassis Critical Alarm.

### **Card Critical Alarm**

If a Card Critical alarm is asserted, nCC will:

- Determine which option card the alarm is associated with.
- Identify all the outputs from the chassis that are affected by the failed card.
- Determine the hardware and license keys required to generate the affected output(s), and identify suitable spare resources within the system (this must be a suitable spare card in a different chassis).
- If suitable spare resources are found, configure the spare to generate the failed outputs.

## Chassis Critical Alarm

If a Chassis Critical alarm is asserted, or if nCC loses communications with the chassis, nCC will switch all the outputs generated in the failed chassis to a suitable spare chassis if one is available.

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## Control Network Redundancy

### Overview

The control network is assigned to the physical Ethernet ports Ctrl1 and Ctrl2. The lower number port of the pair is considered to be the [primary port](#), and the other the spare.

### Operation

If both ports have a link up, and the Control Port Selection is set to Automatic Redundant, then the [primary port](#) will respond to network traffic, but the spare port will not.

However, if the link goes down on the primary port, then the spare port will start to respond to network traffic.

### Automatic Redundancy Mode

In automatic redundancy mode the [primary port](#) is used as default. If the primary port link fails, control passes to the secondary port. However, if the primary port link is restored then control passes back to the primary after the [Auto-Revert](#) delay period.

The behavior of the system when the primary link is re-established depends on the Control Port Auto-Revert Time setting. If the Control Port Auto-Revert Time is set to 0, then the spare port remains the active control port until its link goes down.

Otherwise, after the primary port has had a link present for the defined period of time, it will resume being the active control port, and the spare port will cease responding to network traffic.

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## Auto Revert Delay

If the control port selection = Automatic, then the Auto-Revert Delay defines the period for which the primary port must have resumed a link up state before it automatically becomes the active port.

The Auto-Revert Delay period is set in the range 0 to 999 seconds, with 2 seconds being the default value. If this is set to 0 then there is no automatic switch back to the primary port

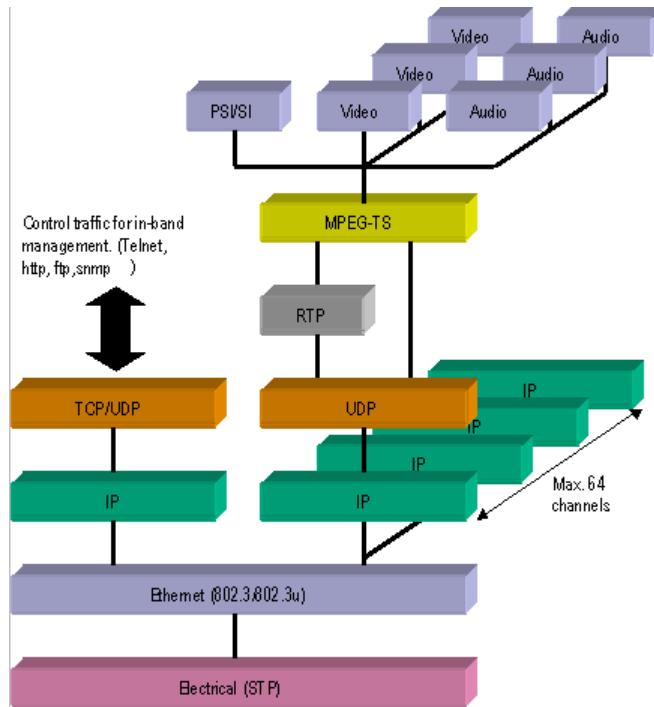
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## IP Encapsulation of Transport Streams

### Mapping of MPEG-2 TS Packets

The mapping of MPEG-2 TS packets into IP data frames is done according to the protocol stack shown in the following illustration.



## MPEG Layer

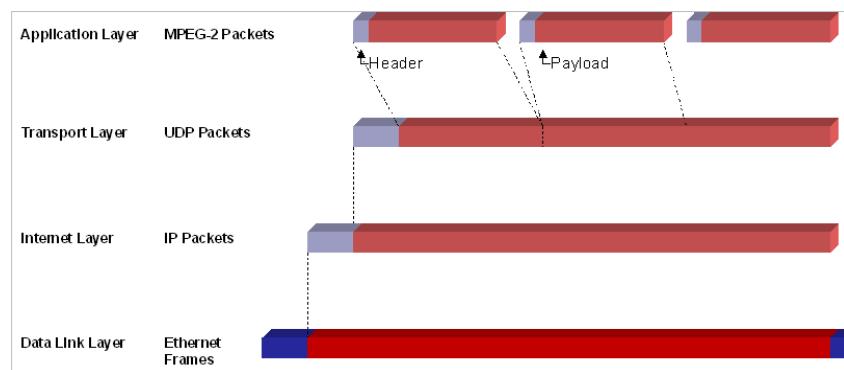
The MPEG-2/DVB layer is specified in ISO/IEC IS 13818 "Generic Coding of Moving Pictures and Associated Audio". The main functionality of this layer is to transform MPTS (Multi-Program Transport Streams) into a number of SPTS (Single-Program Transport Streams). A transport stream carrying multiple programs is in this way split into a number of 'mini' transport streams, each carrying a single program. This ensures that the video can be passed through limited bandwidth links such as ADSL further down the transmission path.

## RTP Layer

The RTP layer is optional, and will add an 8-byte RTP header to the new packet. This header contains a sequence number and a time stamp.

## UDP Layer

The UDP layer is according to RFC768 "User Datagram Protocol". The user can control the target UDP port number for the MPEG-2 stream. A configurable number of 188-byte long MPEG-2 TS packets are mapped straight into an UDP frame with no additional overhead. The MTU for Ethernet is usually 1500 bytes. This limits the number of MPEG-2 TS packets per UDP frame to lie within 1 to 7. The following illustration shows the mapping of MPEG-2 transport streams into UDP packets.



## IP Layer

The IP layer is according to RFC791 "Internet Protocol Specification". The user is allowed access to the following IP header fields: IP source address, IP destination address, Time-To-Live field, Type-Of-Service field. Performing static mapping between class-D IP addresses and the corresponding Ethernet multicast MAC addresses supports limited IP Multicasting (Type 1).

## Ethernet Layer

The data link layer is Ethernet according to IEEE 802.3/802.3u (auto sensing 10/100 Mbps, Twisted Pair, RJ-45 connector).

## IP Overhead

The IP overhead calculation when mapping MPEG-2 TS packets into IP frames is shown in the following table.

	<b>Overhead factor</b>	<b>Comments</b>
MPEG-2 TS	1.0	
UDP	$1324/1316 = 1.006$	UDP header=8 bytes
IP	$1344/1324 = 1.015$	IP header=20 bytes
Ethernet	$1358/1344 = 1.010$	Eth header=14 bytes

Total overhead factor becomes:  $1.006 \times 1.015 \times 1.010 = 1.031$  or 3.1% overhead.

### NOTE...

**The number of MPEG-2 TS packets one can map down into each UDP frame is variable (between 1 and 7). Usually 7 is used for minimum overhead. This is also used in the above calculation.**

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## Alarm Lists

### Base Unit

#### HD H.264 VCM

#### SD MPEG-2 VCM

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## Base Chassis Alarms

The following table lists the alarm and failure identifiers generated within the Host Controller of the chassis.

Name	Module	Slot	Port ID (hex)	ID (dec)	Type	Description
Fan Failure	Base Unit	Host	0	00000441 1089	internal	Permanent damage may be caused by running the chassis whilst the fans are not working. Failure to take action may cause permanent
Over Temperature Warning	Base Unit	Host	0	00000442 1090	internal	damage to the chassis. Please check the fans are working

					correctly, and that the ambient temperature is not excessive. Failure to take action may cause permanent damage to the chassis. Please switch off and refer to Customer Support. At least one start-up test has failed. Problems may be experienced with the normal operation of the chassis.
Over Temperature	Base Unit	Host	0 00000443 1091	internal	Please switch off and refer to Customer Support. At least one start-up test has failed. Problems may be experienced with the normal operation of the chassis.
Power On Self Test Failure	Base Unit	Host	0 00000444 1092	internal	+12V A rail has failed. Please check
+12V A Failed	Base Unit	Host	0 00000445 1093	internal	internal supply or contact Customer Support. +12V B rail has failed. Please check
+12V B Failed	Base Unit	Host	0 00000446 1094	internal	internal supply or contact Customer Support. The Real-time clock has failed. The
Real Time Clock	Base Unit	Host	0 00000447 1095	internal	time/date will not be stored between power-ups. The chassis could not contact the NTP Server. The time/date will drift over time.
NTP Server Response Timeout	Base Unit	Host	0 00000448 1096	internal	An Internal Hardware Issue has occurred.
Internal Hardware Issue	Base Unit	Host	0 00000449 1097	internal	The system may not function properly. Host software is not at an officially released version. Host function may not be affected.
Host Build Version Mismatch	Base Unit	Host	0 0000044A 1098	internal	The system 27 MHz VCXO

<b>System Clock Not Locked</b>	Base Unit	Host	0 0000044B 1099	internal	is not locked. Check if the internal Mux SCR Source is valid.
<b>Chassis Identity Not Programmed</b>	Base Unit	Host	0 0000044C 1100	internal	The chassis identity of the host could not be read correctly.
<b>Selected Mux SCR Source is not present</b>	Base Unit	Host	0 0000044D 1101	internal	Selected Mux SCR Source could not be detected. Check if the Sync Card is plugged in.
<b>Host Identity Not Programmed</b>	Base Unit	Host	0 0000044E 1102	internal	The host identity could not be read correctly. This combination of host and option card software is not officially supported.
<b>Uncontrolled release</b>	Base Unit	Host	0 0000044F 1103	internal	This may lead to unexpected behaviour.
<b>Option card failed to boot</b>	Base Unit Slot 1 to Slot 6	0 00000421 1057	internal	internal	The card did not boot. It may be faulty.
<b>Option Card Comms Failure in slot</b>	Base Unit Slot 1 to Slot 6	0 00000422 1058	internal	internal	An option card failed to respond to the host.
<b>HW Configuration Mismatch in slot</b>	Base Unit Slot 1 to Slot 6	0 00000440 1088	internal	internal	The option card fitted does not match that of the expected configuration.
<b>Unrecognized Option Card in slot</b>	Base Unit Slot 1 to Slot 6	0 00000439 1081	internal	internal	This alarm can be cleared by accepting the config in the Option Slots menu.
<b>Ctrl 1: Link Down</b>	Base Unit	Host	5 00000401 1025	output	The id prom of the option
<b>Ctrl 1: Duplicate IP Address</b>	Base Unit	Host	5 00000407 1031	output	could not be read correctly.
<b>Ctrl 2: Link Down</b>	Base Unit	Host	6 00000402 1026	output	
<b>Ctrl 2: Duplicate IP Address</b>	Base Unit	Host	6 00000407 1031	output	
<b>Data 1: Link Down</b>	Base Unit	Host	1 00000403 1027	output	
<b>Data 1: Duplicate IP Address</b>	Base Unit	Host	1 00000408 1032	output	
<b>Data 2: Link Down</b>	Base Unit	Host	2 00000404 1028	output	
<b>Data 2: Duplicate IP Address</b>	Base Unit	Host	2 00000409 1033	output	
<b>Data 3: Link Down</b>	Base Unit	Host	3 00000405 1029	output	
<b>Data 3: Duplicate IP Address</b>	Base Unit	Host	3 0000040A 1034	output	
<b>Data 4: Link Down</b>	Base Unit	Host	4 00000406 1030	output	
<b>Data 4: Duplicate IP Address</b>	Base Unit	Host	4 0000040B 1035	output	
					An option

<b>Referenced Output Stream Unavailable</b>	<b>Base Unit Slot 1 to Slot 6 0 00000461 1121</b>	<b>internal</b>	<b>card is not installed in the specified slot or it cannot provide the requested output stream.</b>
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## HD H.264 VCM Alarms - EN8190

The following table lists the alarm and failure identifiers generated by the HD H.264 VCM.

### HD H.264 Pre-Processor Module

Name	Module	Slot	Port	ID (hex)	ID (dec)	Type	Description
Over Temperature Warning	EN8190 Pre-Processor Module	Slot 3	0	000C0001	786433	internal	Failure to take action may cause permanent damage to the chassis. Please check the fans are working correctly, and that the ambient temperature is not excessive.
Over Temperature	EN8190 Pre-Processor Module	Slot 3	0	000C0002	786434	internal	Failure to take action may cause permanent damage to the chassis. Please switch off and refer to Customer Support.
Invalid Parameter	EN8190 Pre-Processor Module	Slot 3	0	000C0003	786435	internal	Invalid Parameter received by the Video/Audio Module. Please see Video Encoder status for a more detailed description of the error.
Video/Audio Module Error	EN8190 Pre-Processor Module	Slot 3	0	000C0004	786436	internal	Video/Audio Module Error. Please see Video Encoder status for a more detailed description of the error.
Power On Self Test Failure	EN8190 Pre-Processor Module	Slot 3	0	000C0006	786438	internal	At least one start-up test has failed. Problems may be experienced with the normal operation of the chassis.
Internal HW Information	EN8190 Pre-Processor Module	Slot 3	0	000C0007	786439	internal	HW reported an unexpected status value. This does not effect normal operation of the chassis.
Option Card Build Version Mismatch	EN8190 Pre-Processor Module	Slot 3	0	000C0008	786440	internal	The software on this option card is not an officially released version.
SMPTE334 Closed Captions Input Lock	EN8190 Pre-Processor Module	Slot 3	1	000C0009	786441	input	No valid SMPTE334 Closed Captions can be detected
Video Processor Boot Failure	EN8190 Pre-Processor Module	Slot 3	1	000C0010	786448	internal	At least one video processor has not booted
Video Processor Alive Count Failure	EN8190 Pre-Processor Module	Slot 3	1	000C0011	786449	internal	At least one video processor has not incremented its alive count
Timecode Locked	EN8190 Pre-Processor Module	Slot 3	1	000C0012	786450	input	Timecode extraction is on but no timecode is present
Video Input Lock	EN8190 Pre-Processor Module	Slot 3	1	000C0005	786437	input	No valid video found on video input. Please check source connection.
Audio1 DD Pass Thru sync loss	Audio Module	Slot 3	0	000C0041	786497	input	Audio and Video were not locked prior to encoder input.
Audio1 Input Lock	Audio Module	Slot 3	0	000C0042	786498	input	No valid audio found on selected input.

Audio1 ADS Control Track	Audio Module Slot 3 0 000C0043 786499	input	Please check source connection. Control track for Audio Description not present
Audio1 silence	Audio Module Slot 3 0 000C0044 786500	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio1 loss of metadata	Audio Module Slot 3 0 000C0045 786501	input	Metadata input lost and encoder set to stop encoding on loss.
Audio2 DD Pass Thru sync loss	Audio Module Slot 3 0 000C0051 786513	input	Audio and Video were not locked prior to encoder input.
Audio2 Input Lock	Audio Module Slot 3 0 000C0052 786514	input	No valid audio found on selected input. Please check source connection.
Audio2 ADS Control Track	Audio Module Slot 3 0 000C0053 786515	input	Control track for Audio Description not present
Audio2 silence	Audio Module Slot 3 0 000C0054 786516	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio2 loss of metadata	Audio Module Slot 3 0 000C0055 786517	input	Metadata input lost and encoder set to stop encoding on loss.
Audio3 DD Pass Thru sync loss	Audio Module Slot 3 0 000C0061 786529	input	Audio and Video were not locked prior to encoder input.
Audio3 Input Lock	Audio Module Slot 3 0 000C0062 786530	input	No valid audio found on selected input. Please check source connection.
Audio3 ADS Control Track	Audio Module Slot 3 0 000C0063 786531	input	Control track for Audio Description not present
Audio3 silence	Audio Module Slot 3 0 000C0064 786532	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio3 loss of metadata	Audio Module Slot 3 0 000C0065 786533	input	Metadata input lost and encoder set to stop encoding on loss.
Audio4 DD Pass Thru sync loss	Audio Module Slot 3 0 000C0071 786545	input	Audio and Video were not locked prior to encoder input.
Audio4 Input Lock	Audio Module Slot 3 0 000C0072 786546	input	No valid audio found on selected input. Please check source connection.
Audio4 ADS Control Track	Audio Module Slot 3 0 000C0073 786547	input	Control track for Audio Description not present
Audio4 silence	Audio Module Slot 3 0 000C0074 786548	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio4 loss of metadata	Audio Module Slot 3 0 000C0075 786549	input	Metadata input lost and encoder set to stop encoding on loss.
Audio5 DD Pass Thru sync loss	Audio Module Slot 3 0 000C0081 786561	input	Audio and Video were not locked prior to encoder input.
Audio5 Input Lock	Audio Module Slot 3 0 000C0082 786562	input	No valid audio found on selected input. Please check source connection.
Audio5 ADS Control Track	Audio Module Slot 3 0 000C0083 786563	input	Control track for Audio Description not present
Audio5 silence	Audio Module Slot 3 0 000C0084 786564	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio5 loss of metadata	Audio Module Slot 3 0 000C0085 786565	input	Metadata input lost and encoder set to stop encoding on loss.
Audio6 DD Pass Thru sync loss	Audio Module Slot 3 0 000C0091 786577	input	Audio and Video were not locked prior to encoder input.
Audio6 Input Lock	Audio Module Slot 3 0 000C0092 786578	input	No valid audio found on selected input. Please check source connection.
Audio6 ADS Control Track	Audio Module Slot 3 0 000C0093 786579	input	Control track for Audio Description not present
Audio6 silence	Audio Module Slot 3 0 000C0094 786580	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio6 loss of metadata	Audio Module Slot 3 0 000C0095 786581	input	Metadata input lost and encoder set to stop encoding on loss.
Audio7 DD Pass Thru sync loss	Audio Module Slot 3 0 000C00A1 786593	input	Audio and Video were not locked prior to encoder input.
Audio7 Input Lock	Audio Module Slot 3 0 000C00A2 786594	input	No valid audio found on selected input. Please check source connection.
Audio7 ADS Control Track	Audio Module Slot 3 0 000C00A3 786595	input	Control track for Audio Description not present
Audio7 silence	Audio Module Slot 3 0 000C00A4 786596	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio7 loss of metadata	Audio Module Slot 3 0 000C00A5 786597	input	Metadata input lost and encoder set to stop encoding on loss.
Audio8 DD Pass Thru sync loss	Audio Module Slot 3 0 000C00B1 786609	input	Audio and Video were not locked prior to encoder input.
			No valid audio found on selected input.

<b>Audio8 Input Lock</b>	<b>Audio Module</b>	<b>Slot 3</b>	<b>0</b>	<b>000C00B2</b>	<b>786610</b>	<b>input</b>	<b>Please check source connection.</b>
<b>Audio8 ADS Control Track</b>	<b>Audio Module</b>	<b>Slot 3</b>	<b>0</b>	<b>000C00B3</b>	<b>786611</b>	<b>input</b>	<b>Control track for Audio Description not present</b>
<b>Audio8 silence</b>	<b>Audio Module</b>	<b>Slot 3</b>	<b>0</b>	<b>000C00B4</b>	<b>786612</b>	<b>input</b>	<b>Silent period detected. Valid only for Audio Description Service encoding.</b>
<b>Audio8 loss of metadata</b>	<b>Audio Module</b>	<b>Slot 3</b>	<b>0</b>	<b>000C00B5</b>	<b>786613</b>	<b>input</b>	<b>Metadata input lost and encoder set to stop encoding on loss.</b>

## HD H.264 Encoder Module

Name	Module	Slot	Port	ID (hex)	ID (dec)	Type	Description
Over Temperature Warning	EN8190 Encoder Module	Slot 4	0	000D0001	851969	internal	Failure to take action may cause permanent damage to the chassis. Please check the fans are working correctly, and that the ambient temperature is not excessive.
Over Temperature	EN8190 Encoder Module	Slot 4	0	000D0002	851970	internal	Failure to take action may cause permanent damage to the chassis. Please switch off and refer to Customer Support.
Invalid Parameter	EN8190 Encoder Module	Slot 4	0	000D0003	851971	internal	Invalid Parameter received by the Video/Audio Module. Please see Video Encoder status for a more detailed description of the error.
Video/Audio Module Error	EN8190 Encoder Module	Slot 4	0	000D0004	851972	internal	Video/Audio Module Error. Please see Video Encoder status for a more detailed description of the error.
Power On Self Test Failure	EN8190 Encoder Module	Slot 4	0	000D0006	851974	internal	At least one start-up test has failed. Problems may be experienced with the normal operation of the chassis.
Internal HW Information	EN8190 Encoder Module	Slot 4	0	000D0007	851975	internal	HW reported an unexpected status value. This does not effect normal operation of the chassis.
Option Card Build Version Mismatch	EN8190 Encoder Module	Slot 4	0	000D0008	851976	internal	The software on this option card is not an officially released version.
SMPTE334 Closed Captions Input Lock	EN8190 Encoder Module	Slot 4	1	000D0009	851977	input	No valid SMPTE334 Closed Captions can be detected
Video DSP Not Alive	EN8190 Encoder Module	Slot 4	1	000D000A	851978	internal	Video DSP alive count not incremented
Failed to Configure Device	EN8190 Encoder Module	Slot 4	1	000D000B	851979	internal	FPGA load failed
Unexpected Values in Debug Registers	EN8190 Encoder Module	Slot 4	1	000D000C	851980	internal	See logs for further information

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## SD MPEG2 VCM Alarms - EN8100 and EN7100

The following table lists the alarm and failure identifiers generated by the SD MPEG2 VCM.

Name	Module	Slot	Port	ID (hex)	ID (dec)	Type	Description
Over Temperature Warning	MPEG2 Video Coding Module	Slot n	0	000A0001	655361	internal	Failure to take action may cause permanent damage to the chassis. Please check the fans are working correctly, and that the ambient temperature is not excessive.
Over	MPEG2 Video	Slot n	0	000A0002	655362	internal	Failure to take action may cause permanent damage to the chassis.

<b>Temperature</b>	<b>Coding Module</b>					<b>Please switch off and refer to Customer Support.</b>
<b>Invalid Parameter</b>	<b>MPEG2 Video Coding Module</b>	Slot n	0	000A0003	655363	internal <b>Invalid Parameter received by the Video/Audio Module. Please see Video Encoder status for a more detailed description of the error.</b>
<b>Video/Audio Module Error</b>	<b>MPEG2 Video Coding Module</b>	Slot n	0	000A0004	655364	internal <b>Video/Audio Module Error. Please see Video Encoder status for a more detailed description of the error.</b>
<b>Power On Self Test Failure</b>	<b>MPEG2 Video Coding Module</b>	Slot n	0	000A0006	655366	internal <b>At least one start-up test has failed. Problems may be experienced with the normal operation of the chassis.</b>
<b>Internal HW Information</b>	<b>MPEG2 Video Coding Module</b>	Slot n	0	000A0007	655367	internal <b>HW reported an unexpected status value. This does not effect normal operation of the chassis.</b>
<b>Option Card Build Version Mismatch</b>	<b>MPEG2 Video Coding Module</b>	Slot n	0	000A0008	655368	internal <b>The software on this option card is not an officially released version.</b>
<b>SMPTE334 Closed Captions Input Lock</b>	<b>MPEG2 Video Coding Module</b>	Slot n	1	000A0009	655369	input <b>No valid SMPTE334 Closed Captions can be detected</b>
<b>Anc Bar Data Input Lock</b>	<b>MPEG2 Video Coding Module</b>	Slot n	1	000A000A	655370	input <b>No valid bar data can be detected.</b>
<b>Video Input Lock</b>	<b>MPEG2 Video Coding Module</b>	Slot n	1	000A0005	655365	input <b>No valid video found on video input. Please check source connection.</b>
VBI teletext not detected on input	<b>VBI</b>	Slot n	1	000A0021	655393	input Unable to find teletext data on all of the configured lines. Please check the video input. For more details on the type of VBI, see the VBI status page.
VBI video index not detected on input	<b>VBI</b>	Slot n	1	000A0022	655394	input Unable to find video index data on any of the configured lines. Please check the video input. For more details on the type of VBI, see the VBI status page.
VBI closed captions not detected on input	<b>VBI</b>	Slot n	1	000A0023	655395	input Unable to find closed caption data on any of the configured lines. Please check the video input. For more details on the type of VBI, see the VBI status page.
VBI WSS not detected on input	<b>VBI</b>	Slot n	1	000A0024	655396	input Unable to find WSS (ETSI or AFD) data on any of the configured lines. Please check the video input. For more details on the type of VBI, see the VBI status page.
VITC not detected on input	<b>VBI</b>	Slot n	1	000A0025	655397	input Unable to find VITC data on any of the configured lines. Please check the video input. For more details on the type of VBI, see the VBI status page.
Selected Time code source not detected	<b>VBI</b>	Slot n	1	000A0026	655398	input For the selected Time code source no Time code was found. If in auto mode no source was found on any input. Make sure that the correct source is configured.
<b>Dolby E Alignment</b>	<b>Audio Module</b>	Slot n	0	000A0030	655408	input <b>Dolby E frames not properly aligned to video frames. May glitch on frame drop/repeat.</b>
<b>Dolby E Input Lock</b>	<b>Audio Module</b>	Slot n	0	000A0031	655409	input <b>No valid Dolby E found on selected input.</b>
<b>Audio1 DD Pass Thru sync loss</b>	<b>Audio Module</b>	Slot n	0	000A0041	655425	input <b>Audio and Video were not locked prior to encoder input.</b>
<b>Audio1 Input Lock</b>	<b>Audio Module</b>	Slot n	0	000A0042	655426	input <b>No valid audio found on selected input. Please check source connection.</b>
<b>Audio1 ADS Control Track</b>	<b>Audio Module</b>	Slot n	0	000A0043	655427	input <b>Control track for Audio Description not present</b>
<b>Audio1 silence</b>	<b>Audio Module</b>	Slot n	0	000A0044	655428	input <b>Silent period detected. Valid only for Audio Description Service encoding.</b>
<b>Audio1 loss of</b>	<b>Audio</b>					<b>Metadata input lost and encoder set to</b>

metadata	Module	Slot n	0	000A0045	655429	input	stop encoding on loss.
Audio2 DD Pass Thru sync loss	Audio Module	Slot n	0	000A0051	655441	input	Audio and Video were not locked prior to encoder input.
Audio2 Input Lock	Audio Module	Slot n	0	000A0052	655442	input	No valid audio found on selected input. Please check source connection.
Audio2 ADS Control Track	Audio Module	Slot n	0	000A0053	655443	input	Control track for Audio Description not present
Audio2 silence	Audio Module	Slot n	0	000A0054	655444	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio2 loss of metadata	Audio Module	Slot n	0	000A0055	655445	input	Metadata input lost and encoder set to stop encoding on loss.
Audio3 DD Pass Thru sync loss	Audio Module	Slot n	0	000A0061	655457	input	Audio and Video were not locked prior to encoder input.
Audio3 Input Lock	Audio Module	Slot n	0	000A0062	655458	input	No valid audio found on selected input. Please check source connection.
Audio3 ADS Control Track	Audio Module	Slot n	0	000A0063	655459	input	Control track for Audio Description not present
Audio3 silence	Audio Module	Slot n	0	000A0064	655460	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio3 loss of metadata	Audio Module	Slot n	0	000A0065	655461	input	Metadata input lost and encoder set to stop encoding on loss.
Audio4 DD Pass Thru sync loss	Audio Module	Slot n	0	000A0071	655473	input	Audio and Video were not locked prior to encoder input.
Audio4 Input Lock	Audio Module	Slot n	0	000A0072	655474	input	No valid audio found on selected input. Please check source connection.
Audio4 ADS Control Track	Audio Module	Slot n	0	000A0073	655475	input	Control track for Audio Description not present
Audio4 silence	Audio Module	Slot n	0	000A0074	655476	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio4 loss of metadata	Audio Module	Slot n	0	000A0075	655477	input	Metadata input lost and encoder set to stop encoding on loss.
Audio5 DD Pass Thru sync loss	Audio Module	Slot n	0	000A0081	655489	input	Audio and Video were not locked prior to encoder input.
Audio5 Input Lock	Audio Module	Slot n	0	000A0082	655490	input	No valid audio found on selected input. Please check source connection.
Audio5 ADS Control Track	Audio Module	Slot n	0	000A0083	655491	input	Control track for Audio Description not present
Audio5 silence	Audio Module	Slot n	0	000A0084	655492	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio5 loss of metadata	Audio Module	Slot n	0	000A0085	655493	input	Metadata input lost and encoder set to stop encoding on loss.
Audio6 DD Pass Thru sync loss	Audio Module	Slot n	0	000A0091	655505	input	Audio and Video were not locked prior to encoder input.
Audio6 Input Lock	Audio Module	Slot n	0	000A0092	655506	input	No valid audio found on selected input. Please check source connection.
Audio6 ADS Control Track	Audio Module	Slot n	0	000A0093	655507	input	Control track for Audio Description not present
Audio6 silence	Audio Module	Slot n	0	000A0094	655508	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio6 loss of metadata	Audio Module	Slot n	0	000A0095	655509	input	Metadata input lost and encoder set to stop encoding on loss.
Audio7 DD Pass Thru sync loss	Audio Module	Slot n	0	000A00A1	655521	input	Audio and Video were not locked prior to encoder input.
Audio7 Input Lock	Audio Module	Slot n	0	000A00A2	655522	input	No valid audio found on selected input. Please check source connection.
Audio7 ADS Control Track	Audio Module	Slot n	0	000A00A3	655523	input	Control track for Audio Description not present
Audio7 silence	Audio Module	Slot n	0	000A00A4	655524	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio7 loss of metadata	Audio Module	Slot n	0	000A00A5	655525	input	Metadata input lost and encoder set to stop encoding on loss.
Audio8 DD Pass Thru sync loss	Audio Module	Slot n	0	000A00B1	655537	input	Audio and Video were not locked prior to encoder input.
Audio8 Input Lock	Audio Module	Slot n	0	000A00B2	655538	input	No valid audio found on selected input. Please check source connection.
Audio8 ADS Control Track	Audio Module	Slot n	0	000A00B3	655539	input	Control track for Audio Description not present
Audio8 silence	Audio Module	Slot n	0	000A00B4	655540	input	Silent period detected. Valid only for Audio Description Service encoding.
Audio8 loss of	Audio						Metadata input lost and encoder set to

<b>metadata</b>	<b>Module</b>	<b>Slot n</b>	<b>0</b>	<b>000A00B5 655541</b>	<b>input</b>	<b>stop encoding on loss.</b>
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## ASI Option Module Alarms

The following table lists the alarm and failure identifiers generated by the ASI option module.

Name	Module	Slot	Port ID (hex)	ID (dec)	Type	Description
Over Temperature Warning	ASI IO Module	Slot 1 0	000E0001	917505	internal	Failure to take action may cause permanent damage to the chassis. Please check the fans are working correctly, and that the ambient temperature is not excessive.
Over Temperature	ASI IO Module	Slot 1 0	000E0002	917506	internal	Failure to take action may cause permanent damage to the chassis. Please switch off and refer to Customer Support.
Invalid Parameter	ASI IO Module	Slot 1 0	000E0003	917507	internal	Invalid Parameter received by the ASI IO Module. Please see Video Encoder status for a more detailed description of the error.
Module Error	ASI IO Module	Slot 1 0	000E0004	917508	internal	Option Card Error. Please see log for a more detailed description of the error.
Power On Self Test Failure	ASI IO Module	Slot 1 0	000E0006	917510	internal	At least one start-up test has failed. Problems may be experienced with the normal operation of the chassis.
Internal HW Information	ASI IO Module	Slot 1 0	000E0007	917511	internal	HW reported an unexpected status value. This does not effect normal operation of the chassis.
Option Card Build Version Mismatch	ASI IO Module	Slot 1 0	000E0008	917512	internal	The software on this option card is not an officially released version.
ASI Output Error	ASI IO Module	Slot 1 0	00110020	1114144	internal	An error has occurred in ASI Output 1. See the log for more details.

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